

## **6 REQUIREMENTS FOR MOBILE STATION CDMA OPERATION**

This section only details requirements that are specific to CDMA mobile station equipment and operation. See Section 2 and Section 4 for analog mobile station requirements.

### **6.1 Transmitter**

#### **6.1.1 Frequency Parameters**

##### **6.1.1.1 Channel Spacing and Designation**

Channel spacing and designation for the dual-mode mobile station transmissions shall be as specified in 2.1.1.1. The mobile station shall support CDMA operations on channel numbers 1013 through 1023, and 1 through 777 inclusive, as shown in Table 6.1.1.1-1.

The CDMA frequency assignment in MHz corresponding to the CDMA Channel number shown in Table 6.1.1.1-1 (expressed as N) is calculated as shown in Table 6.1.1.1-2.

##### **6.1.1.2 Frequency Tolerance**

When operating in the CDMA transmission mode, the mobile station transmit carrier frequency shall be 45.0 MHz  $\pm$ 300 Hz lower than the frequency of the base station transmit signal as measured at the mobile station receiver.

#### **6.1.2 Power Output Characteristics**

All power levels are referenced to the mobile station antenna connector unless otherwise specified.

##### **6.1.2.1 Maximum Output Power**

The absolute maximum effective radiated power (ERP) with respect to a half-wave dipole for any class mobile station transmitter shall be 8 dBW (6.3 Watts). ERP measured during a transmitted power control group (see 6.1.3.1.7.1) for each mobile station class when commanded to maximum output power shall be within the limits given in Table 6.1.2.1-1. Transmission at maximum power shall not degrade the spurious emission levels as specified in 6.1.4.2. An inoperative antenna assembly shall not degrade spurious emission levels as specified in 6.1.4.2.

**Table 6.1.1.1-1. CDMA Channel Numbers and Corresponding Frequencies**

System	Valid CDMA Frequency Assignments	Analog Channel Count	CDMA Channel Number	Transmitter Frequency Assignment (MHz)	
				Mobile	Base
<b>A"</b> (1 MHz)	////////	22	991	824.040	869.040
			1012	824.670	869.670
	CDMA	11	1013	824.700	869.700
			1023	825.000	870.000
<b>A</b> (10 MHz)	CDMA	333	1	825.030	870.030
			333	834.990	879.990
			334	835.020	880.020
<b>B</b> (10 MHz)	CDMA	333	666	844.980	889.980
			667	845.010	890.010
			716	846.480	891.480
<b>A'</b> (1.5 MHz)	CDMA	50	717	846.510	891.510
			777	848.310	893.310
<b>B'</b> (2.5 MHz)	CDMA	61	778	848.340	893.340
			799	848.970	893.970
	////////	22			

Frequencies in shaded (////////) regions are not valid for CDMA frequency assignments.

**Table 6.1.1.1-2. CDMA Channel Number to CDMA Frequency Assignment Correspondence**

Transmitter	CDMA Channel Number	CDMA Frequency Assignment, MHz
Mobile Station	$1 \leq N \leq 777$	$0.030 N + 825.000$
	$1013 \leq N \leq 1023$	$0.030 (N-1023) + 825.000$
Base Station	$1 \leq N \leq 777$	$0.030 N + 870.000$
	$1013 \leq N \leq 1023$	$0.030 (N-1023) + 870.000$

**Table 6.1.2.1-1. Effective Radiated Power at Maximum Output Power**

Mobile Station Class	ERP at Maximum Output Shall Exceed	ERP at Maximum Output Shall not Exceed
I	1 dBW (1.25 watts)	8 dBW (6.3 watts)
II	-3 dBW (0.5 watts)	4 dBW (2.5 watts)
III	-7 dBW (0.2 watts)	0 dBW (1.0 watts)

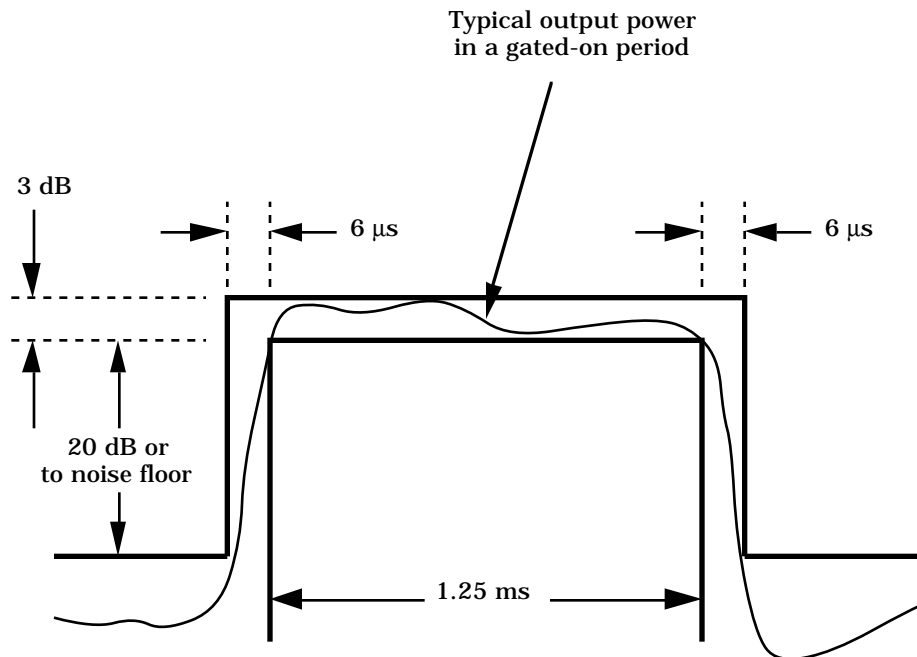
#### 6.1.2.2 Output Power Limits

##### 6.1.2.2.1 Minimum Controlled Output Power

With both closed loop and open loop power control functions set to minimum (see 6.1.2.3), the mean output power of the mobile station shall be less than -50 dBm/1.23 MHz (-111 dBm/Hz) for all frequencies within  $\pm 615$  kHz of the center frequency.

##### 6.1.2.2.2 Gated Output Power

When operating in variable data rate transmission mode (see 6.1.3.1.7.1), the mobile station shall transmit at nominal controlled power levels only during gated-on periods. During gated-off periods, the mobile station shall reduce its ERP either by at least 20 dB with respect to the power of the most recent gated-on period, or to the transmitter noise floor, whichever is greater. The transmitter noise floor should be less than -60 dBm/1.23 MHz and shall be less than -54 dBm/1.23 MHz. The duration of a single gated-on power control group shall be at least 1.25 ms. The transition time from either the gated-on level to the gated-off level or from the gated-off level to the gated-on level shall be within the limits shown in Figure 6.1.2.2.2-1.



**Figure 6.1.2.2.2-1. Transmission Envelope Mask (Single Gated-on Power Control Group)**

#### 6.1.2.2.3 Standby Output Power

The mobile station shall disable its transmitter except when transmitting an access probe when in the *System Access State* or when in the *Mobile Station Control on the Traffic Channel State* (see 6.6.3 and 6.6.4). When the transmitter is disabled, the output noise density of the mobile station shall be less than -60 dBm/1.23 MHz for all frequencies within the mobile station's transmit band between 824 and 849 MHz.

#### 6.1.2.3 Controlled Output Power

When operating in the CDMA transmission mode, mobile stations shall provide two independent means for output power adjustment: open loop estimation, solely a mobile station operation, and closed loop correction, involving both the mobile station and the base station.

Accuracy requirements on the controlled range of mean output power (see 6.1.2.3 and 6.1.2.4) need not apply for the following three cases: mean output power levels exceeding the minimum ERP at the maximum output power for the corresponding mobile station class (see Table 6.1.2.1-1); mean output power levels less than the minimum controlled output power (see 6.1.2.2.1); or mean input power levels exceeding -25 dBm.

##### 6.1.2.3.1 Estimated Open Loop Output Power

In the following equations, mean power is referenced to the nominal CDMA Channel bandwidth of 1.23 MHz.

For open loop probing on the Access Channel (with closed loop correction inactive) the mobile station shall transmit the first probe at a mean output power level defined by<sup>1</sup>

$$\begin{aligned} \text{mean output power (dBm)} = & - \text{mean input power (dBm)} \\ & - 73 \\ & + 0.5 \times \text{NOM\_PWR (dB)} \\ & + 0.5 \times \text{INIT\_PWR (dB)}. \end{aligned}$$

Subsequent probes in an access probe sequence are sent at increased power levels until a response is obtained or the sequence ends (see 6.6.3.1).

The initial transmission on the Reverse Traffic Channel shall be at a mean output power defined by<sup>2</sup>

$$\begin{aligned} \text{mean output power (dBm)} = & - \text{mean input power (dBm)} \\ & - 73 \\ & + 0.5 \times \text{NOM\_PWR (dB)} \\ & + 0.5 \times \text{INIT\_PWR (dB)} \\ & + \text{the sum of all access probe corrections (dB)}. \end{aligned}$$

Once the first power control bit has been received after initializing Reverse Traffic Channel transmissions, the mean output power shall be defined by

$$\begin{aligned} \text{mean output power (dBm)} = & - \text{mean input power (dBm)} \\ & - 73 \\ & + 0.5 \times \text{NOM\_PWR (dB)} \\ & + 0.5 \times \text{INIT\_PWR (dB)} \\ & + \text{the sum of all access probe corrections (dB)} \\ & + \text{the sum of all closed loop power control corrections (dB)}. \end{aligned}$$

The values for NOM\_PWR and INIT\_PWR are system parameters, specified in the *Access Parameters Message* (see 7.7.2.3.2) and acquired by the mobile station prior to transmitting. The range of the NOM\_PWR parameter is  $\pm 64$  dB, with a nominal value of 0 dB. The range of the INIT\_PWR parameter is  $\pm 16$  dB, with a nominal value of 0 dB.

Prior to application of access probe corrections, closed loop power control corrections, and with NOM\_PWR set to zero, the mobile station's estimated open loop mean output power

---

<sup>1</sup>The purpose of having two parameters is to distinguish between their use. If INIT\_PWR were 0, then NOM\_PWR is the correction that should provide the correct received power at the base station. INIT\_PWR is the adjustment that is made to the first Access Channel probe so that it should be received at somewhat less than the required signal power. This conservatism partially compensates for occasional, partially decorrelated path losses between the Forward CDMA Channel and the Reverse CDMA Channel.

<sup>2</sup>The terms  $(-\text{mean input power (dBm)} - 73 + 0.5 \times \text{NOM\_PWR (dB)})$  can be thought of as an open loop estimate of the required power for an Access Channel transmission. The terms  $(0.5 \times \text{INIT\_PWR (dB)} + \text{the sum of all access probe corrections})$  can be thought of as the closed loop correction for Access Channel transmissions with the loop being through the base station. The total is an open estimate of the initial required transmit power on the Reverse Traffic Channel.

should be within  $\pm 6$  dB and shall be within  $\pm 9$  dB of the value determined by the following relationship:

$$\begin{aligned} \text{mean output power (dBm)} = & - \text{mean input power (dBm)} \\ & - 73 \\ & + 0.5 \times \text{INIT\_PWR (dB)}. \end{aligned}$$

This requirement shall be met over the full range of INIT\_PWR (from -16 to +16).

#### 6.1.2.3.2 Closed Loop Output Power

For closed loop correction on the Reverse Traffic Channel (with respect to the open loop estimate), the mobile station shall adjust its mean output power level in response to each valid power control bit (see 7.1.3.1.7) received on the Forward Traffic Channel. A power control bit shall be considered valid if it is received in a 1.25 ms timeslot (see 6.1.3.1.7.1) that is the second timeslot following a timeslot in which the mobile station transmitted. When the mobile station is transmitting at the full data rate (9600 bps),<sup>3</sup> the change in mean output power level per single power control bit shall be 0.5 dB. When the mobile station is transmitting at less than the full data rate, the change in the mean output power level for each valid power control bit shall vary according to the number of timeslots since the last valid power control bit was received, in accordance with Table 6.1.2.3.2-1. The total changed closed loop mean output power shall be the accumulation of the level changes. The mobile station shall lock the accumulation of level changes and shall ignore received power control bits when the transmitter is disabled.

After accumulating the power control steps (with 0.25 dB resolution), the mobile station may truncate the mean output power but shall preserve at least 0.5 dB resolution.<sup>4</sup> That is, if the total accumulation is 1.0 dB and 2 timeslots have elapsed since the last valid power control bit, then the mean output power may increase by 0.5 dB instead of 0.75 dB; if the total accumulation is 1.25 dB and two timeslots have elapsed since the last valid power control bit, then the mean output power may increase by 1.0 dB.<sup>5</sup> After the allowed truncation, the change in mean output power per single power control bit shall be within  $\pm 0.3$  dB of the values specified by Table 6.1.2.3.2-1, and the change in mean output power level per 10 valid power control bits of the same sign and level change shall be within  $\pm 20\%$  of 10 times the values specified in Table 6.1.2.3.2-1. A '0' power control bit implies an increase in transmit power; a '1' power control bit implies a decrease in transmit power.

The mobile station shall provide a closed loop adjustment range greater than  $\pm 24$  dB around its open loop estimate.

---

<sup>3</sup>At the full data rate, every power control bit is valid.

<sup>4</sup>The purpose of the 0.25 dB steps in the table is to provide finer control of the power level when averaged over several power control bits.

<sup>5</sup>In the first case, the accumulated value would be 1.0 dB + 0.75 dB equalling 1.75 dB. If truncation is used, the previous output level would be 1.0 dB, and the new output level would be 1.5 dB. In the

See 6.6.6.2.7.2 for combining power control bits received from different multipath components or from different base stations during handoff.

**Table 6.1.2.3.2-1. Power Level Change per Power Control Bit**

<b>Timeslots since Last Valid Power Control Bit<sup>6</sup></b>	<b>Level Change per Power Control Bit</b>
1	0.50 dB
2	0.75 dB
3	0.75 dB
4	1.00 dB
5	1.00 dB
6	1.25 dB
7	1.25 dB
8	1.50 dB
9	1.50 dB
10	1.50 dB
11	1.75 dB
12	1.75 dB
13	1.75 dB
14	1.75 dB
15	1.75 dB

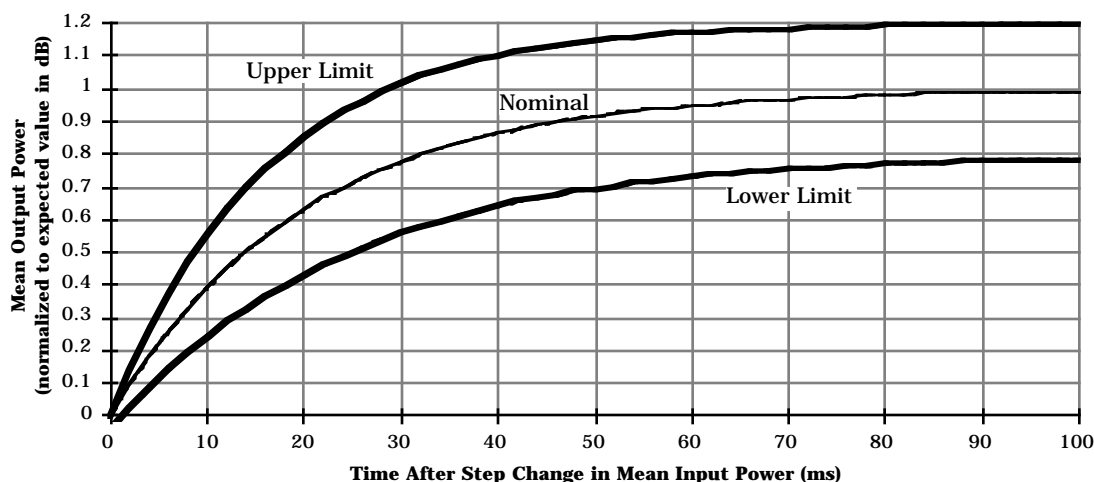
#### 6.1.2.4 Power Transition Characteristics

##### 6.1.2.4.1 Open Loop Estimation

Following a step change in mean input power, the mean output power of the mobile station shall transition between levels within the limits shown in Figure 6.1.2.4.1-1. These limits shall apply for step changes in mean input power of  $\pm 30$  dB or less. As an example, if the mean input power change step is -30 dB, the expected change in mean output power is +30 dB. The upper limit on the change is  $1.2 \times 30$  dB = 36 dB, and the lower limit is  $0.8 \times 30$  dB = 24 dB, as shown in Figure 6.1.2.4.1-1.

second case, the accumulated value would be 1.25 dB + 0.75 dB which equals 2.0 dB. If truncation is used, the previous output level would be 1.0 dB, and the new output level would be 2.0 dB.

<sup>6</sup>For example, one timeslot since the last valid power control bit means that the previous timeslot contained a valid power control bit.



**Figure 6.1.2.4.1-1. Open Loop Power Transition Mask**

#### 6.1.2.4.2 Closed Loop Correction

Following the reception of a valid closed loop power control bit, the mean output power of the mobile station shall be within 0.3 dB of final value in less than 500  $\mu$ s.

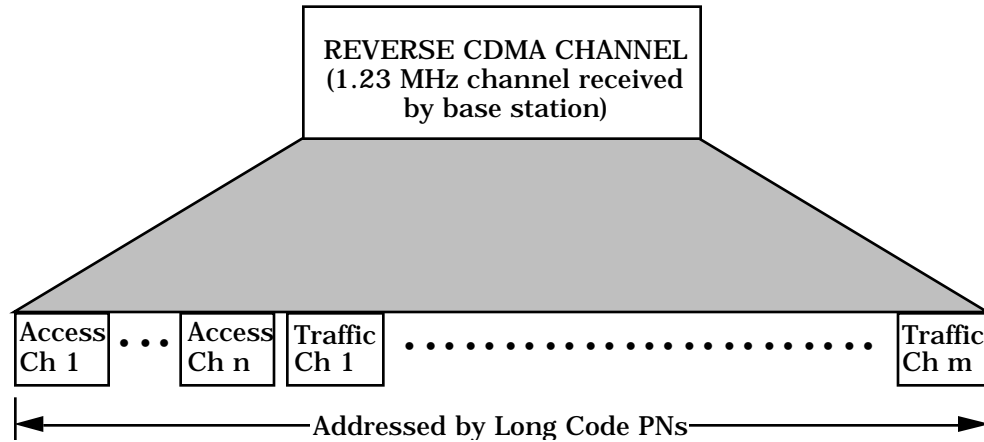
### 6.1.3 Modulation Characteristics

#### 6.1.3.1 Reverse CDMA Channel Signals

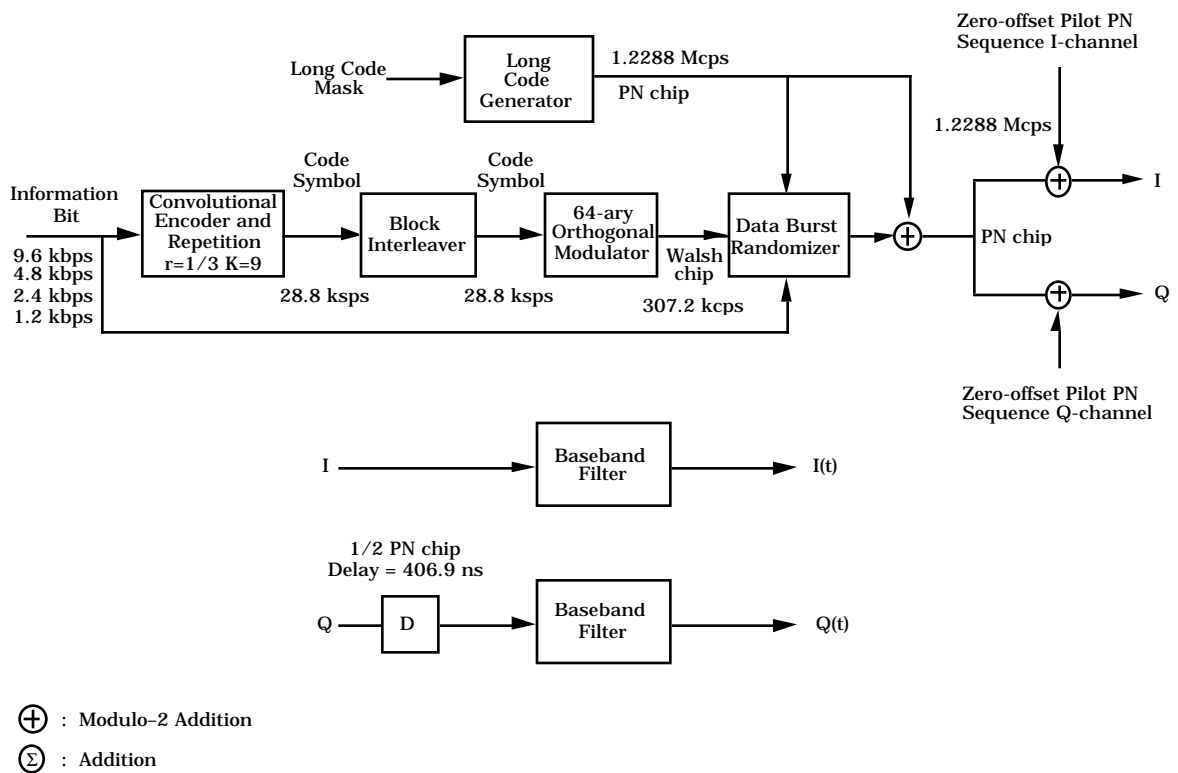
The Reverse CDMA Channel is composed of Access Channels and Reverse Traffic Channels. These channels shall share the same CDMA frequency assignment using direct-sequence CDMA techniques. Figure 6.1.3.1-1 shows an example of all of the signals received by a base station on the Reverse CDMA Channel. Each Traffic Channel or Access Channel is identified by a distinct user long code. Multiple Reverse CDMA Channels may be used by a base station in a frequency multiplexed manner.

The modulation process for the Reverse CDMA Channel is as shown in Figure 6.1.3.1-2. Data transmitted on the Reverse CDMA Channel is grouped into 20 ms frames. All data transmitted on the Reverse CDMA Channel is convolutionally encoded, block interleaved, modulated by the 64-ary orthogonal modulation, and direct-sequence spread prior to transmission.





**Figure 6.1.3.1-1. Example of Logical Reverse CDMA Channels Received at a Base Station**



**Figure 6.1.3.1-2. Reverse CDMA Channel Modulation Process**

1 Data frames may be transmitted on the Reverse CDMA Channel at a data rate of 9600,  
2 4800, 2400, or 1200 bps. The Reverse Traffic Channel may use any of these data rates for  
3 transmission. The transmission duty cycle on the Reverse Traffic Channel varies with the  
4 transmission data rate. Specifically, the transmission duty cycle for 9600 bps frames is  
5 100 percent, the transmission duty cycle for 4800 bps frames is 50 percent, the  
6 transmission duty cycle for 2400 bps frames is 25 percent, and the transmission duty cycle  
7 for 1200 bps frames is 12.5 percent as shown in Table 6.1.3.1.1-1. As the duty cycle for  
8 transmission varies proportionately with the data rate, the actual burst transmission rate is  
9 fixed at 28,800 code symbols per second. Since six code symbols are modulated as one of  
10 64 Walsh symbols for transmission, the Walsh symbol transmission rate is fixed at 4800  
11 Walsh symbols per second. This results in a fixed Walsh chip rate of 307.2 kcps. The rate  
12 of the spreading PN sequence is fixed at 1.2288 Mcps, so that each Walsh chip is spread by  
13 four PN chips. Table 6.1.3.1.1-1 defines the signal rates and their relationship for the  
14 various transmission rates on the Reverse Traffic Channel.

15 The numerology is identical for the Access Channel except that the transmission rate is  
16 fixed at 4800 bps, each code symbol is repeated once, and the transmission duty cycle is  
17 100 percent. Table 6.1.3.1.1-2 defines the signal rates and their relationship on the Access  
18 Channel.

#### 19 6.1.3.1.1 Modulation Parameters

20 The modulation parameters for the Reverse Traffic Channel and the Access Channel are  
21 shown in Table 6.1.3.1.1-1 and Table 6.1.3.1.1-2, respectively.

**Table 6.1.3.1.1-1. Reverse Traffic Channel Modulation Parameters**

Parameter	Data Rate (bps)				Units
	9600	4800	2400	1200	
PN Chip Rate	1.2288	1.2288	1.2288	1.2288	Mcps
Code Rate	1/3	1/3	1/3	1/3	bits/code sym
TX Duty Cycle	100.0	50.0	25.0	12.5	%
Code Symbol Rate	28,800	28,800	28,800	28,800	sps
Modulation	6	6	6	6	code sym/Walsh sym
Walsh Symbol Rate	4800	4800	4800	4800	sps
Walsh Chip Rate	307.20	307.20	307.20	307.20	kcps
Walsh Symbol	208.33	208.33	208.33	208.33	μs
PN Chips/Code Symbol	42.67	42.67	42.67	42.67	PN chip/code sym
PN Chips/Walsh Symbol	256	256	256	256	PN chip/Walsh sym
PN Chips/Walsh Chip	4	4	4	4	PN chips/Walsh chip

**Table 6.1.3.1.1-2. Access Channel Modulation Parameters**

Parameter	Data Rate (bps)	
	4800	Units
PN Chip Rate	1.2288	Mcps
Code Rate	1/3	bits/code sym
Code Symbol Repetition	2	symbols/code sym
TX Duty Cycle	100.0	%
Code Symbol Rate	28,800	sps
Modulation	6	code sym/Walsh sym
Walsh Symbol Rate	4800	sps
Walsh Chip Rate	307.20	kcps
Walsh Symbol	208.33	μs
PN Chips/Code Symbol	42.67	PN chip/code sym
PN Chips/Walsh Symbol	256	PN chip/Walsh sym
PN Chips/Walsh Chip	4	PN chips/Walsh chip

#### 6.1.3.1.2 Data Rates

Data shall be transmitted on the Reverse CDMA Channel by frames. Each frame shall be 20 ms in length.

The mobile station shall transmit data frames on the Reverse Traffic Channel at a variable data rate of 9600, 4800, 2400, or 1200 bps. The data rate on the Reverse Traffic Channel shall be selected on a frame-by-frame basis.

The mobile station shall transmit data frames on the Access Channel at a fixed data rate of 4800 bps.

#### 6.1.3.1.3 Convolutional Encoding

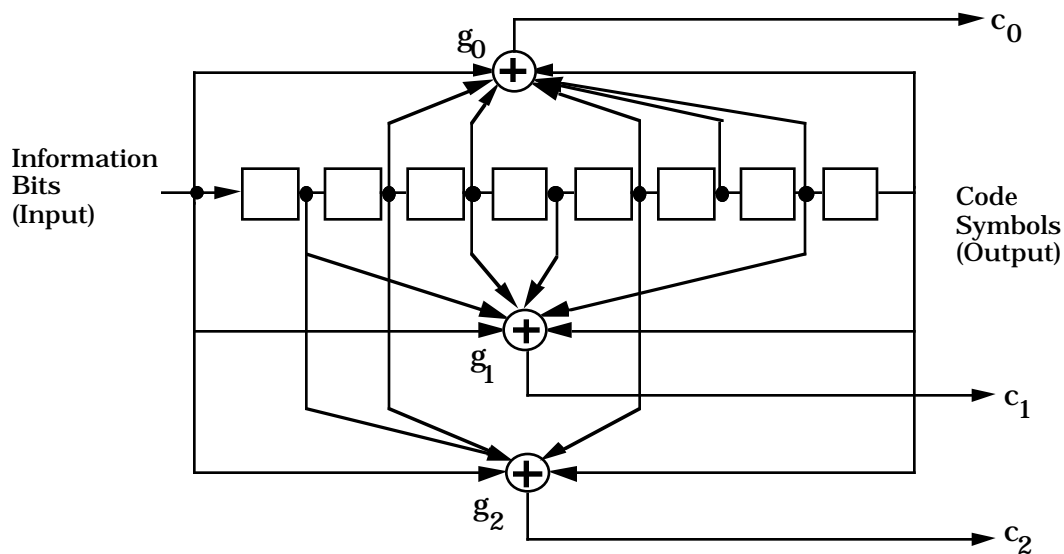
The mobile station shall convolutionally encode the data transmitted on the Reverse Traffic Channel and the Access Channel prior to interleaving. The convolutional code shall be rate 1/3 and has constraint length (K) of 9. The generator functions for this code shall be  $g_0$  equals 557 (octal),  $g_1$  equals 663 (octal), and  $g_2$  equals 711 (octal). Since this is a rate 1/3 code, three code symbols are generated for each data bit input to the encoder. These code symbols shall be output so that the code symbol ( $c_0$ ) encoded with generator function  $g_0$  shall be output first, the code symbol ( $c_1$ ) encoded with generator function  $g_1$  shall be output second, and the code symbol ( $c_2$ ) encoded with generator function  $g_2$  shall be output last. The state of the convolutional encoder, upon initialization, shall be the all-zero state. The first code symbol output after initialization shall be a code symbol encoded with generator function  $g_0$ .

Convolutional encoding involves the modulo-2 addition of selected taps of a serially time-delayed data sequence. The length of the data sequence delay is equal to K-1, where K is the constraint length of the code. Figure 6.1.3.1.3-1 illustrates the encoder for the code specified in this section.

#### 6.1.3.1.4 Code Symbol Repetition

Code symbols output from the convolutional encoder are repeated before being interleaved when the data rate is lower than 9600 bps.

Code symbol repetition on the Reverse Traffic Channel is only used as an expedient method for describing the operation of the block interleaver specified in 6.1.3.1.5 and the data burst randomizer specified in 6.1.3.1.7.2. Implementations other than code symbol repetition that achieve the same result are allowed.



**Figure 6.1.3.1.3-1. K = 9, Rate 1/3 Convolutional Encoder**

The code symbol repetition rate on the Reverse Traffic Channel varies with data rate. Code symbols shall not be repeated for the 9600 bps data rate. Each code symbol at the 4800 bps data rate shall be repeated 1 time (each symbol occurs 2 consecutive times). Each code symbol at the 2400 bps data rate shall be repeated 3 times (each symbol occurs 4 consecutive times). Each code symbol at the 1200 bps data rate shall be repeated 7 times (each symbol occurs 8 consecutive times). For all of the data rates (9600, 4800, 2400, and 1200 bps), this results in a constant code symbol rate of 28800 code symbols per second. On the Reverse Traffic Channel these repeated code symbols shall not be transmitted multiple times. Rather, the repeated code symbols shall be input to the block interleaver function, and all but one of the code symbol repetitions shall be deleted prior to actual transmission due to the variable transmission duty cycle.

Each code symbol on the Access Channel, which has a fixed data rate of 4800 bps, shall be repeated 1 time (each symbol occurs 2 consecutive times). On the Access Channel both repeated code symbols shall be transmitted.

#### 6.1.3.1.5 Block Interleaving

The mobile station shall interleave all code symbols on the Reverse Traffic Channel and the Access Channel prior to modulation and transmission. A block interleaver spanning 20 ms shall be used. The interleaver shall be an array with 32 rows and 18 columns (i.e., 576 cells). Code symbols (repeated code symbols when at data rates lower than 9600 bps) shall be written into the interleaver by columns filling the complete  $32 \times 18$  matrix. Tables 6.1.3.1.5-1 through 6.1.3.1.5-4 illustrate the ordering of write operations of code symbols (or repeated code symbols) into the interleaver array for transmission data rates of 9600, 4800, 2400, and 1200 bps, respectively.

Reverse Traffic Channel code symbols shall be output from the interleaver by rows. The interleaver rows shall be output in the following order:

At 9600 bps:

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32

At 4800 bps:

1 3 2 4 5 7 6 8 9 11 10 12 13 15 14 16 17 19 18 20 21 23 22 24 25 27 26 28 29 31 30 32

At 2400 bps:

1 5 2 6 3 7 4 8 9 13 10 14 11 15 12 16 17 21 18 22 19 23 20 24 25 29 26 30 27 31 28 32

At 1200 bps:

1 9 2 10 3 11 4 12 5 13 6 14 7 15 8 16 17 25 18 26 19 27 20 28 21 29 22 30 23 31 24 32

Access Channel code symbols shall be output from the interleaver by rows. The interleaver rows shall be output in the following order:<sup>7</sup>

1 17 9 25 5 21 13 29 3 19 11 27 7 23 15 31 2 18 10 26 6 22 14 30 4 20 12 28 8 24 16 32

---

<sup>7</sup>This is a bit-reversed readout of the row addresses. If there is a binary counter  $c_4c_3c_2c_1c_0$ , counting from 0 through 31, and  $n$  is a 5-bit binary number,  $n = a_4a_3a_2a_1a_0$ , where  $a_4=c_0$ ,  $a_3=c_1$ ,  $a_2=c_2$ ,  $a_1=c_3$ ,  $a_0=c_4$ , then the row address is given by  $n+1$ .

**Table 6.1.3.1.5-1. Reverse Traffic Channel Interleaver Memory (Write Operation)**  
**(9600 bps)**

1	33	65	97	129	161	193	225	257	289	321	353	385	417	449	481	513	545
2	34	66	98	130	162	194	226	258	290	322	354	386	418	450	482	514	546
3	35	67	99	131	163	195	227	259	291	323	355	387	419	451	483	515	547
4	36	68	100	132	164	196	228	260	292	324	356	388	420	452	484	516	548
5	37	69	101	133	165	197	229	261	293	325	357	389	421	453	485	517	549
6	38	70	102	134	166	198	230	262	294	326	358	390	422	454	486	518	550
7	39	71	103	135	167	199	231	263	295	327	359	391	423	455	487	519	551
8	40	72	104	136	168	200	232	264	296	328	360	392	424	456	488	520	552
9	41	73	105	137	169	201	233	265	297	329	361	393	425	457	489	521	553
10	42	74	106	138	170	202	234	266	298	330	362	394	426	458	490	522	554
11	43	75	107	139	171	203	235	267	299	331	363	395	427	459	491	523	555
12	44	76	108	140	172	204	236	268	300	332	364	396	428	460	492	524	556
13	45	77	109	141	173	205	237	269	301	333	365	397	429	461	493	525	557
14	46	78	110	142	174	206	238	270	302	334	366	398	430	462	494	526	558
15	47	79	111	143	175	207	239	271	303	335	367	399	431	463	495	527	559
16	48	80	112	144	176	208	240	272	304	336	368	400	432	464	496	528	560
17	49	81	113	145	177	209	241	273	305	337	369	401	433	465	497	529	561
18	50	82	114	146	178	210	242	274	306	338	370	402	434	466	498	530	562
19	51	83	115	147	179	211	243	275	307	339	371	403	435	467	499	531	563
20	52	84	116	148	180	212	244	276	308	340	372	404	436	468	500	532	564
21	53	85	117	149	181	213	245	277	309	341	373	405	437	469	501	533	565
22	54	86	118	150	182	214	246	278	310	342	374	406	438	470	502	534	566
23	55	87	119	151	183	215	247	279	311	343	375	407	439	471	503	535	567
24	56	88	120	152	184	216	248	280	312	344	376	408	440	472	504	536	568
25	57	89	121	153	185	217	249	281	313	345	377	409	441	473	505	537	569
26	58	90	122	154	186	218	250	282	314	346	378	410	442	474	506	538	570
27	59	91	123	155	187	219	251	283	315	347	379	411	443	475	507	539	571
28	60	92	124	156	188	220	252	284	316	348	380	412	444	476	508	540	572
29	61	93	125	157	189	221	253	285	317	349	381	413	445	477	509	541	573
30	62	94	126	158	190	222	254	286	318	350	382	414	446	478	510	542	574
31	63	95	127	159	191	223	255	287	319	351	383	415	447	479	511	543	575
32	64	96	128	160	192	224	256	288	320	352	384	416	448	480	512	544	576

**Table 6.1.3.1.5-2. Reverse Traffic Channel or Access Channel Interleaver Memory  
(Write Operation) (4800 bps)**

1	17	33	49	65	81	97	113	129	145	161	177	193	209	225	241	257	273
1	17	33	49	65	81	97	113	129	145	161	177	193	209	225	241	257	273
2	18	34	50	66	82	98	114	130	146	162	178	194	210	226	242	258	274
2	18	34	50	66	82	98	114	130	146	162	178	194	210	226	242	258	274
3	19	35	51	67	83	99	115	131	147	163	179	195	211	227	243	259	275
3	19	35	51	67	83	99	115	131	147	163	179	195	211	227	243	259	275
4	20	36	52	68	84	100	116	132	148	164	180	196	212	228	244	260	276
4	20	36	52	68	84	100	116	132	148	164	180	196	212	228	244	260	276
5	21	37	53	69	85	101	117	133	149	165	181	197	213	229	245	261	277
5	21	37	53	69	85	101	117	133	149	165	181	197	213	229	245	261	277
6	22	38	54	70	86	102	118	134	150	166	182	198	214	230	246	262	278
6	22	38	54	70	86	102	118	134	150	166	182	198	214	230	246	262	278
7	23	39	55	71	87	103	119	135	151	167	183	199	215	231	247	263	279
7	23	39	55	71	87	103	119	135	151	167	183	199	215	231	247	263	279
8	24	40	56	72	88	104	120	136	152	168	184	200	216	232	248	264	280
8	24	40	56	72	88	104	120	136	152	168	184	200	216	232	248	264	280
9	25	41	57	73	89	105	121	137	153	169	185	201	217	233	249	265	281
9	25	41	57	73	89	105	121	137	153	169	185	201	217	233	249	265	281
10	26	42	58	74	90	106	122	138	154	170	186	202	218	234	250	266	282
10	26	42	58	74	90	106	122	138	154	170	186	202	218	234	250	266	282
11	27	43	59	75	91	107	123	139	155	171	187	203	219	235	251	267	283
11	27	43	59	75	91	107	123	139	155	171	187	203	219	235	251	267	283
12	28	44	60	76	92	108	124	140	156	172	188	204	220	236	252	268	284
12	28	44	60	76	92	108	124	140	156	172	188	204	220	236	252	268	284
13	29	45	61	77	93	109	125	141	157	173	189	205	221	237	253	269	285
13	29	45	61	77	93	109	125	141	157	173	189	205	221	237	253	269	285
14	30	46	62	78	94	110	126	142	158	174	190	206	222	238	254	270	286
14	30	46	62	78	94	110	126	142	158	174	190	206	222	238	254	270	286
15	31	47	63	79	95	111	127	143	159	175	191	207	223	239	255	271	287
15	31	47	63	79	95	111	127	143	159	175	191	207	223	239	255	271	287
16	32	48	64	80	96	112	128	144	160	176	192	208	224	240	256	272	288
16	32	48	64	80	96	112	128	144	160	176	192	208	224	240	256	272	288



**Table 6.1.3.1.5-3. Reverse Traffic Channel Interleaver Memory (Write Operation)**  
**(2400 bps)**

1	9	17	25	33	41	49	57	65	73	81	89	97	105	113	121	129	137
1	9	17	25	33	41	49	57	65	73	81	89	97	105	113	121	129	137
1	9	17	25	33	41	49	57	65	73	81	89	97	105	113	121	129	137
1	9	17	25	33	41	49	57	65	73	81	89	97	105	113	121	129	137
2	10	18	26	34	42	50	58	66	74	82	90	98	106	114	122	130	138
2	10	18	26	34	42	50	58	66	74	82	90	98	106	114	122	130	138
2	10	18	26	34	42	50	58	66	74	82	90	98	106	114	122	130	138
2	10	18	26	34	42	50	58	66	74	82	90	98	106	114	122	130	138
3	11	19	27	35	43	51	59	67	75	83	91	99	107	115	123	131	139
3	11	19	27	35	43	51	59	67	75	83	91	99	107	115	123	131	139
3	11	19	27	35	43	51	59	67	75	83	91	99	107	115	123	131	139
3	11	19	27	35	43	51	59	67	75	83	91	99	107	115	123	131	139
4	12	20	28	36	44	52	60	68	76	84	92	100	108	116	124	132	140
4	12	20	28	36	44	52	60	68	76	84	92	100	108	116	124	132	140
4	12	20	28	36	44	52	60	68	76	84	92	100	108	116	124	132	140
4	12	20	28	36	44	52	60	68	76	84	92	100	108	116	124	132	140
5	13	21	29	37	45	53	61	69	77	85	93	101	109	117	125	133	141
5	13	21	29	37	45	53	61	69	77	85	93	101	109	117	125	133	141
5	13	21	29	37	45	53	61	69	77	85	93	101	109	117	125	133	141
5	13	21	29	37	45	53	61	69	77	85	93	101	109	117	125	133	141
6	14	22	30	38	46	54	62	70	78	86	94	102	110	118	126	134	142
6	14	22	30	38	46	54	62	70	78	86	94	102	110	118	126	134	142
6	14	22	30	38	46	54	62	70	78	86	94	102	110	118	126	134	142
6	14	22	30	38	46	54	62	70	78	86	94	102	110	118	126	134	142
7	15	23	31	39	47	55	63	71	79	87	95	103	111	119	127	135	143
7	15	23	31	39	47	55	63	71	79	87	95	103	111	119	127	135	143
7	15	23	31	39	47	55	63	71	79	87	95	103	111	119	127	135	143
7	15	23	31	39	47	55	63	71	79	87	95	103	111	119	127	135	143
8	16	24	32	40	48	56	64	72	80	88	96	104	112	120	128	136	144
8	16	24	32	40	48	56	64	72	80	88	96	104	112	120	128	136	144
8	16	24	32	40	48	56	64	72	80	88	96	104	112	120	128	136	144
8	16	24	32	40	48	56	64	72	80	88	96	104	112	120	128	136	144

1  
2

3

### 6.1.3.1.6 Orthogonal Modulation

Modulation for the Reverse CDMA Channel shall be 64-ary orthogonal modulation. One of 64 possible modulation symbols is transmitted for each six code symbols. The modulation symbol shall be one of 64 mutually orthogonal waveforms generated using Walsh functions. These modulation symbols are given in Table 6.1.3.1.6-1 and are numbered 0 through 63. The modulation symbols shall be selected according to the following formula:

$$\text{Modulation symbol number} = c_0 + 2c_1 + 4c_2 + 8c_3 + 16c_4 + 32c_5,$$

where  $c_5$  shall represent the last (or most recent) and  $c_0$  the first (or oldest) binary valued ('0' and '1') code symbol of each group of six code symbols that form a modulation symbol.

The 64 by 64 matrix shown in Table 6.1.3.1.6-1 can be generated by means of the following recursive procedure:

$$H_1 = 0, \quad H_2 = \begin{bmatrix} 0 & 0 \\ 0 & 1 \end{bmatrix},$$

$$H_4 = \begin{bmatrix} 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 1 \\ 0 & 1 & 1 & 0 \end{bmatrix}, \quad H_{2N} = \begin{bmatrix} H_N & H_N \\ H_N & \overline{H_N} \end{bmatrix}, \text{ N is a power of 2.}$$

The period of time required to transmit a single modulation symbol is referred to as a Walsh symbol interval and shall be equal to 1/4800 second (= 208.333...  $\mu$ s). The period of time associated with one-sixty-fourth of the modulation symbol is referred to as a Walsh chip and shall be equal to 1/307200 second (= 3.255...  $\mu$ s).

Within a Walsh symbol, Walsh chips shall be transmitted in the order of 0, 1, 2, ..., 63.



### 6.1.3.1.7 Variable Data Rate Transmission

#### 6.1.3.1.7.1 Rates and Gating

Prior to transmission, the Reverse Traffic Channel interleaver output stream is gated with a time filter that allows transmission of certain interleaver output symbols and deletion of others. This process is illustrated in Figure 6.1.3.1.7.1-1. As shown in the figure, the duty cycle of the transmission gate varies with the transmit data rate. When the transmit data rate is 9600 bps, the transmission gate allows all interleaver output symbols to be transmitted. When the transmit data rate is 4800 bps, the transmission gate allows one-half of the interleaver output symbols to be transmitted, and so forth. The gating process operates by dividing the 20 ms frame into 16 equal length (i.e., 1.25 ms) periods, called power control groups. Certain power control groups are gated-on (i.e., transmitted), while other groups are gated-off (i.e., not transmitted).

The assignment of gated-on and gated-off groups, referred to as the data burst randomizing function, is specified in 6.1.3.1.7.2. The gated-on power control groups are pseudorandomized in their positions within the frame. The data burst randomizer ensures that every code symbol input to the repetition process is transmitted exactly once. During the gated-off periods, the mobile station shall comply with the requirement in 6.1.2.2.2, thus reducing the interference to other mobile stations operating on the same Reverse CDMA Channel.

When transmitting on the Access Channel, the code symbols are repeated once (each symbol occurs twice) prior to transmission. The data burst randomizer is not used when the mobile station transmits on the Access Channel. Therefore, both copies of the repeated code symbols are transmitted as shown in Figure 6.1.3.1.7.1-2.

#### 6.1.3.1.7.2 Data Burst Randomizing Algorithm

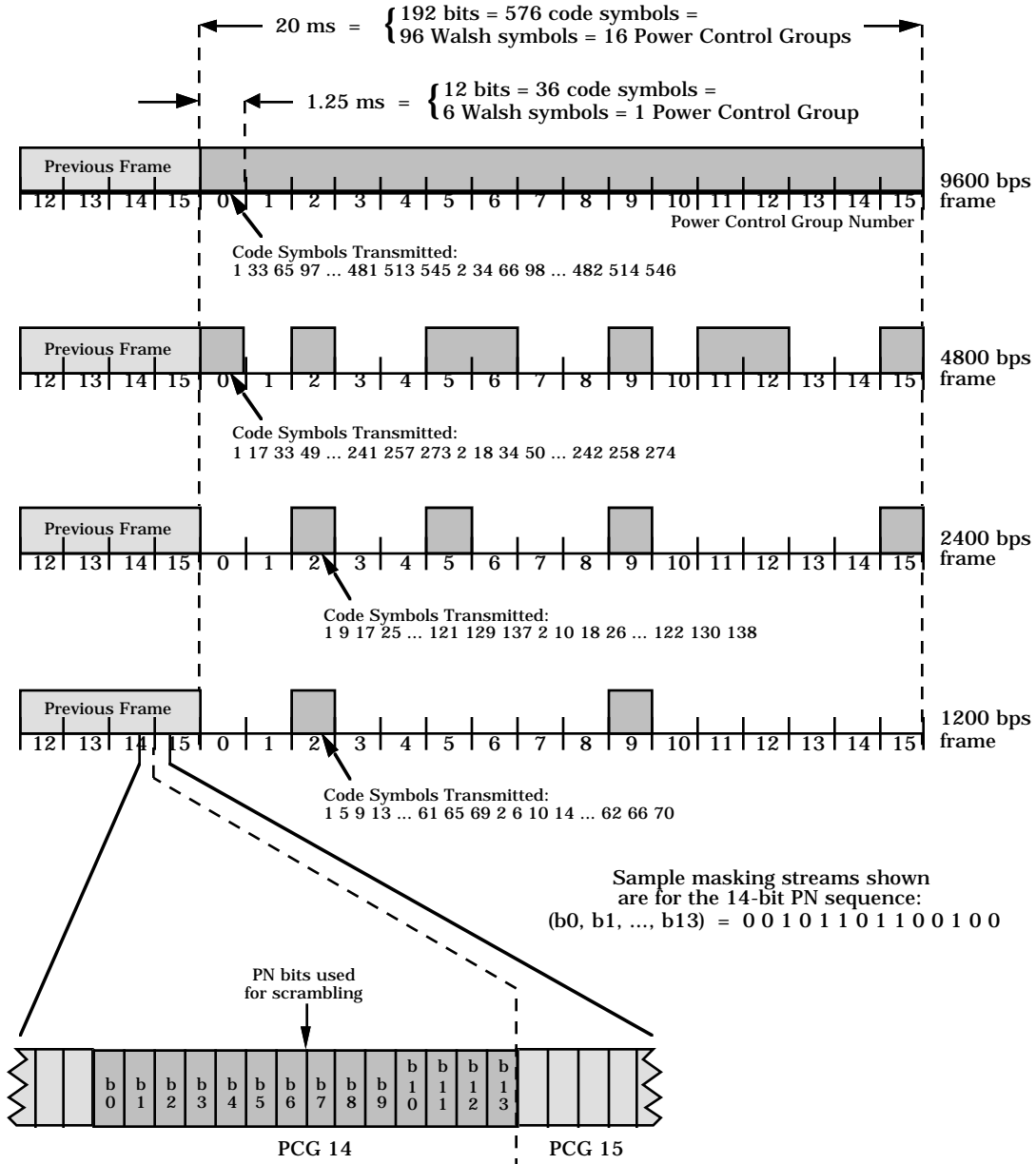
The data burst randomizer generates a masking pattern of '0's and '1's that randomly masks out the redundant data generated by the code repetition. The masking pattern is determined by the data rate of the frame and by a block of 14 bits taken from the long code. These 14 bits shall be the last 14 bits of the long code used for spreading in the second last power control group of the previous frame. In other words, these are the 14 bits which occur exactly one power control group (1.25 ms) before each Reverse Traffic Channel frame boundary. These 14 bits are denoted as

$$b_0 \ b_1 \ b_2 \ b_3 \ b_4 \ b_5 \ b_6 \ b_7 \ b_8 \ b_9 \ b_{10} \ b_{11} \ b_{12} \ b_{13},$$

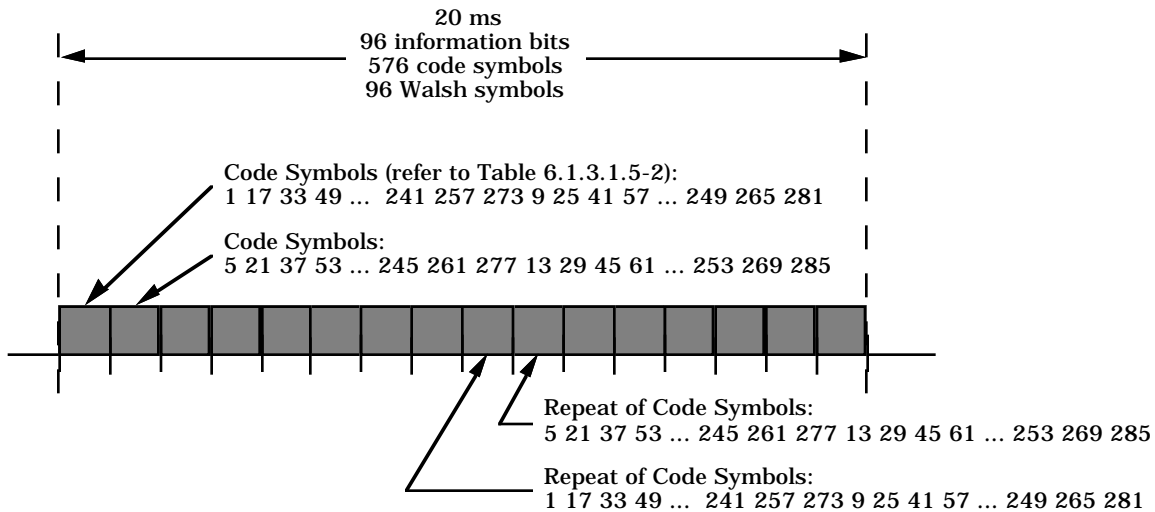
where  $b_0$  represents the oldest bit, and  $b_{13}$  represents the latest bit.<sup>8</sup>

---

<sup>8</sup>In order to randomize the position of the data bursts, only 8 bits are strictly necessary. The algorithm described here uses 14 bits to assure that the slots used for data transmission at the quarter rate are a subset of the slots used at the half rate and that the slots used at the one-eighth rate are a subset of the slots used at the quarter rate.



**Figure 6.1.3.1.7.1-1. Reverse CDMA Channel Variable Data Rate Transmission Example**



**Figure 6.1.3.1.7.1-2. Access Channel Transmission Structure**

Each 20 ms Reverse Traffic Channel frame shall be divided into 16 equal length (i.e., 1.25 ms) power control groups numbered from 0 to 15 as shown in Figure 6.1.3.1.7.1-1. The data burst randomizer algorithm shall be as follows:

Data Rate Selected: 9600 bps

Transmission shall occur on power control groups numbered:

0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15.

Data Rate Selected: 4800 bps

Transmission shall occur on power control groups numbered:

$b_0$ ,  $2 + b_1$ ,  $4 + b_2$ ,  $6 + b_3$ ,  $8 + b_4$ ,  $10 + b_5$ ,  $12 + b_6$ ,  $14 + b_7$ .

Data Rate Selected: 2400 bps

Transmission shall occur on power control groups numbered:

$b_0$  if  $b_8 = 0$ , or  $2 + b_1$  if  $b_8 = 1$ ;  
 $4 + b_2$  if  $b_9 = 0$ , or  $6 + b_3$  if  $b_9 = 1$ ;  
 $8 + b_4$  if  $b_{10} = 0$ , or  $10 + b_5$  if  $b_{10} = 1$ ;  
 $12 + b_6$  if  $b_{11} = 0$ , or  $14 + b_7$  if  $b_{11} = 1$ .

1 Data Rate Selected: 1200 bps

2 Transmission shall occur on power control groups numbered:

3  $b_0$  if  $(b_8 = 0 \text{ and } b_{12} = 0)$ , or  $2 + b_1$  if  $(b_8 = 1 \text{ and } b_{12} = 0)$ ,  
 4 or  $4 + b_2$  if  $(b_9 = 0 \text{ and } b_{12} = 1)$ , or  $6 + b_3$  if  $(b_9 = 1 \text{ and } b_{12} = 1)$ ;  
 5  $8 + b_4$  if  $(b_{10} = 0 \text{ and } b_{13} = 0)$ , or  $10 + b_5$  if  $(b_{10} = 1 \text{ and } b_{13} = 0)$ ,  
 6 or  $12 + b_6$  if  $(b_{11} = 0 \text{ and } b_{13} = 1)$ , or  $14 + b_7$  if  $(b_{11} = 1 \text{ and } b_{13} = 1)$ .

#### 7 6.1.3.1.8 Direct Sequence Spreading

8 Prior to transmission, the Reverse Traffic Channel and the Access Channel shall be direct  
 9 sequence spread by the long code. This spreading operation involves modulo-2 addition of  
 10 the data burst randomizer output stream and the long code.

11 This long code shall be periodic with period  $2^{42}-1$  chips and shall satisfy the linear  
 12 recursion specified by the following characteristic polynomial:

$$\begin{aligned} p(x) = & x^{42} + x^{35} + x^{33} + x^{31} + x^{27} + x^{26} + x^{25} + x^{22} + x^{21} + x^{19} + \\ & x^{18} + x^{17} + x^{16} + x^{10} + x^7 + x^6 + x^5 + x^3 + x^2 + x^1 + 1. \end{aligned}$$

15 Each PN chip of the long code shall be generated by the modulo-2 inner product of a 42-bit  
 16 mask and the 42-bit state vector of the sequence generator as shown in Figure 6.1.3.1.8-1.

17 The time alignment of the long code generator shall be as shown in Figure 1.2-1.

18 The mask used for the long code varies depending on the channel type on which the mobile  
 19 station is transmitting. See Figure 6.1.3.1.8-2. Specifically, when transmitting on the  
 20 Access Channel, the mask shall be as follows:  $M_{41}$  through  $M_{29}$  shall be set to  
 21 '1100011001101';  $M_{28}$  through  $M_{24}$  shall be set to the Access Channel number chosen (see  
 22 6.6.3.1.1.2);  $M_{23}$  through  $M_{21}$  shall be set to the code channel number for the associated  
 23 Paging Channel (the range is 1 through 7),  $M_{20}$  through  $M_9$  shall be set to the REG\_ZONE  
 24 value (see 7.7.2.3.2.1) for the current base station; and  $M_8$  through  $M_0$  shall be set to the  
 25 PILOT\_PN value for the current CDMA Channel (see 7.7.1.3).

26 When transmitting on the Reverse Traffic Channel, the mobile station shall use one of two  
 27 long code masks unique to that mobile station: a public long code mask unique to the  
 28 mobile station's ESN or a private long code mask unique for each MIN. The public long  
 29 code mask shall be as follows:  $M_{41}$  through  $M_{32}$  shall be set to '1100011000', and  $M_{31}$   
 30 through  $M_0$  shall be set to a permutation of the mobile station's ESN bits. This  
 31 permutation is specified as follows:

$$\text{ESN} = (E_{31}, E_{30}, E_{29}, E_{28}, E_{27}, E_{26}, E_{25}, \dots, E_2, E_1, E_0)$$

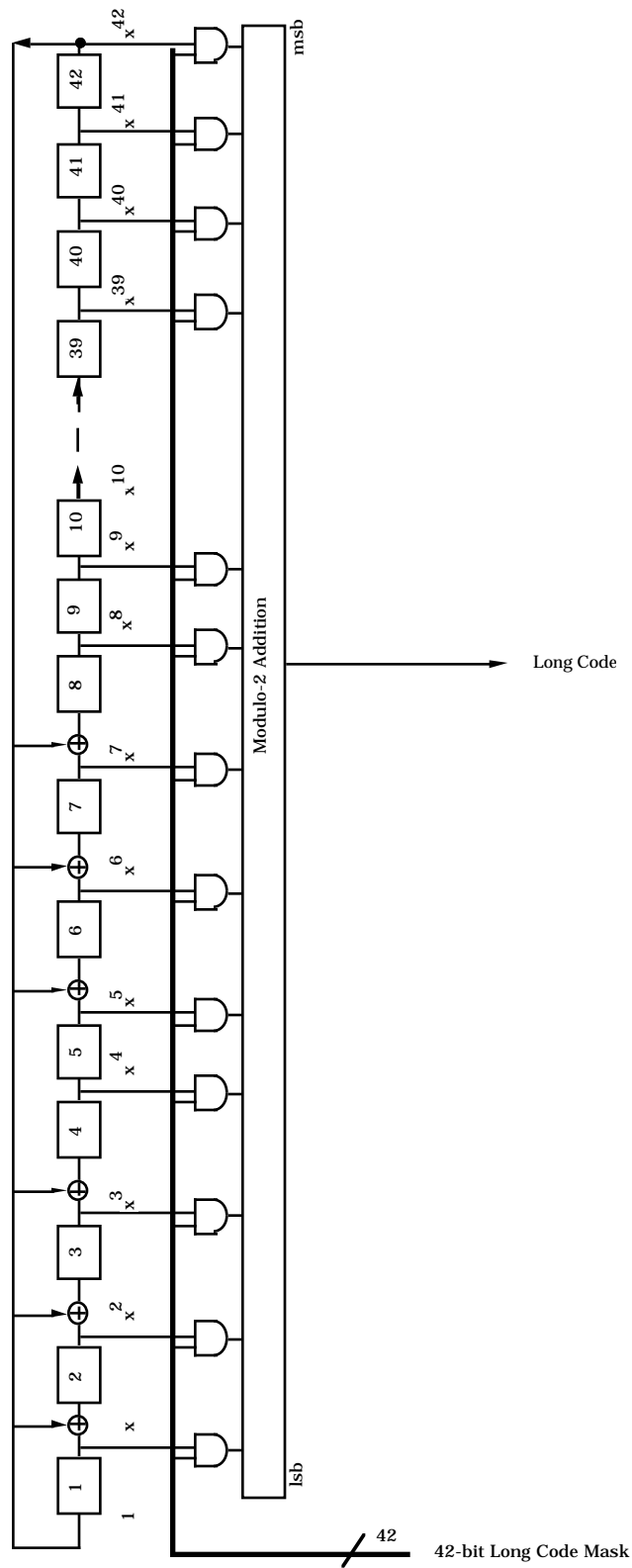
$$\begin{aligned} \text{Permuted ESN} = & (E_0, E_{31}, E_{22}, E_{13}, E_4, E_{26}, E_{17}, E_8, E_{30}, E_{21}, E_{12}, E_3, E_{25}, E_{16}, \\ & E_7, E_{29}, E_{20}, E_{11}, E_2, E_{24}, E_{15}, E_6, E_{28}, E_{19}, E_{10}, E_1, E_{23}, E_{14}, \\ & E_5, E_{27}, E_{18}, E_9).^9 \end{aligned}$$

36 The private long code mask shall be as follows:  $M_{41}$  through  $M_{40}$  shall be set to '01', and  
 37  $M_{39}$  through  $M_0$  shall be set as specified in 6.3.12.3.

---

<sup>9</sup>This permutation prevents high correlation between long codes corresponding to consecutive ESNs.





**Figure 6.1.3.1.8-1. Long Code Generator**

1

2

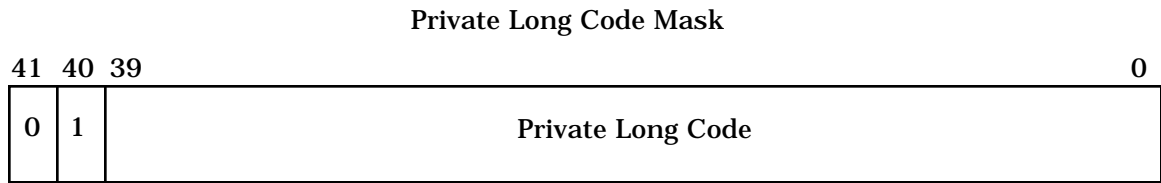
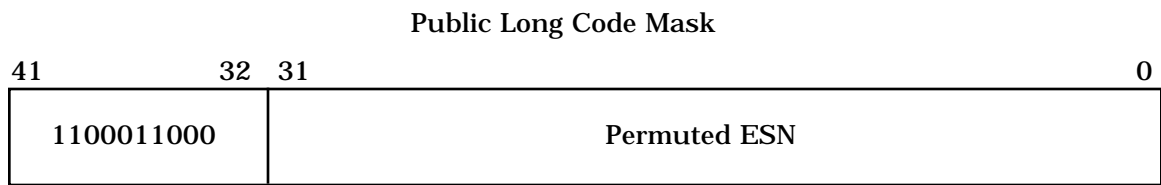
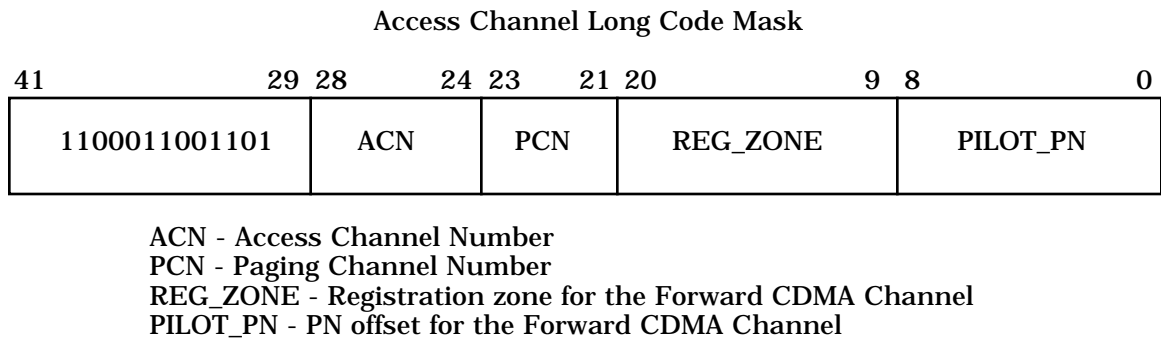


Figure 6.1.3.1.8-2. Long Code Mask Format

### 6.1.3.1.9 Quadrature Spreading

Following the direct sequence spreading, the Reverse Traffic Channel and Access Channel are spread in quadrature as shown in Figure 6.1.3.1-2. The sequences used for this spreading shall be the zero-offset I and Q pilot PN sequences used on the Forward CDMA Channel (see 7.1.3.2.1). These sequences are periodic with period  $2^{15}$  chips and shall be based on the following characteristic polynomials, respectively:

$$P_I(x) = x^{15} + x^{13} + x^9 + x^8 + x^7 + x^5 + 1$$

(for the in-phase (I) sequence)

and

$$P_Q(x) = x^{15} + x^{12} + x^{11} + x^{10} + x^6 + x^5 + x^4 + x^3 + 1$$

(for the quadrature-phase (Q) sequence).

The maximum length linear feedback shift register sequences,  $\{i(n)\}$  and  $\{q(n)\}$ , based on the above polynomials are of period  $2^{15}-1$  and can be generated by using the following linear recursions:

$$i(n) = i(n-15) \oplus i(n-10) \oplus i(n-8) \oplus i(n-7) \oplus i(n-6) \oplus i(n-2)$$

(based on  $P_I(x)$  as the characteristic polynomial)

and

$$q(n) = q(n-15) \oplus q(n-12) \oplus q(n-11) \oplus q(n-10) \oplus q(n-9) \oplus q(n-5) \oplus q(n-4) \oplus q(n-3)$$

(based on  $P_Q(x)$  as the characteristic polynomial),

where  $i(n)$  and  $q(n)$  are binary-valued ('0' and '1') and the additions are modulo-2. In order to obtain the I and Q pilot PN sequences (of period  $2^{15}$ ), a '0' is inserted in  $\{i(n)\}$  and  $\{q(n)\}$  after 14 consecutive '0' outputs (this occurs only once in each period). Therefore, the pilot PN sequences have one run of 15 consecutive '0' outputs instead of 14.

The mobile station shall align the I and Q pilot PN sequences such that the first chip on every even second mark as referenced to the transmit time reference (see 6.1.5.1) is the '1' after the 15 consecutive '0's (see Figure 1.2-1).

The pilot PN sequences repeat every 26.666... ms ( $= 2^{15}/1228800$  seconds). There are exactly 75 repetitions in every 2 seconds.

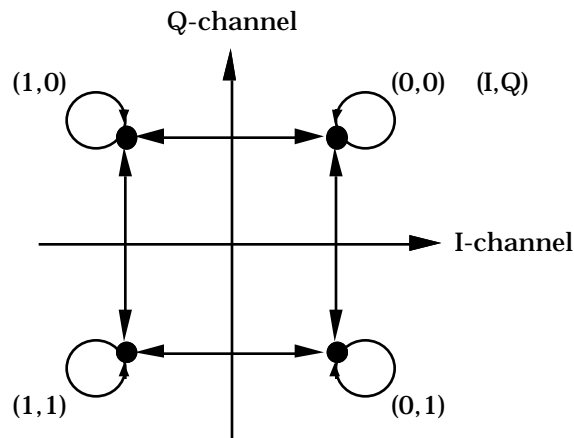
The spreading modulation shall be offset quadrature phase shift keying (OQPSK). The data spread by the Q pilot PN sequence is delayed by half a chip time (406.901 ns) with respect to the data spread by the I pilot PN sequence.

The binary data ('0's and '1's) I and Q shown in Figure 6.1.3.1-2 shall be mapped into phase according to Table 6.1.3.1.9-1.

**Table 6.1.3.1.9-1. Reverse CDMA Channel I and Q Mapping**

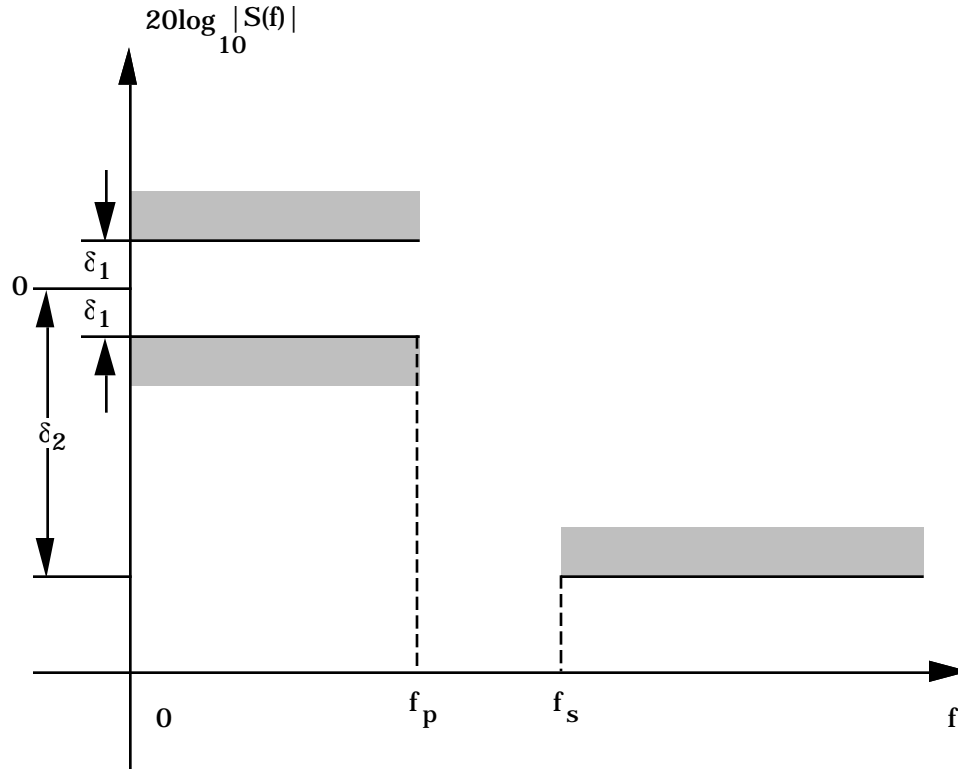
I	Q	Phase
0	0	$\pi/4$
1	0	$3\pi/4$
1	1	$-3\pi/4$
0	1	$-\pi/4$

The resulting signal constellation and phase transition are shown in Figure 6.1.3.1.9-1.

**Figure 6.1.3.1.9-1. Reverse CDMA Channel Signal Constellation and Phase Transition**

#### 6.1.3.1.10 Baseband Filtering

Following the spreading operation, the I and Q data are applied to the inputs of the I and Q baseband filters as shown in Figure 6.1.3.1-2. The baseband filters shall have linear phase. The baseband filters shall have a frequency response  $S(f)$  that satisfies the limits given in Figure 6.1.3.1.10-1. Specifically, the normalized frequency response of the filter shall be contained within  $\pm\delta_1$  in the passband  $0 \leq f \leq f_p$  and shall be less than or equal to  $\delta_2$  in the stopband  $f \geq f_s$ . The numerical values for the parameters are  $\delta_1 = 1.5$  dB,  $\delta_2 = -40$  dB,  $f_p = 590$  kHz, and  $f_s = 740$  kHz.



**Figure 6.1.3.1.10-1. Baseband Filters Frequency Response Limits**

Let  $s(t)$  be the impulse response of the baseband filter. Then  $s(t)$  shall satisfy the following equation:

$$\text{Mean Squared Error} = \sum_{k=0}^{47} [\alpha s(kT_S - \tau) - h(k)]^2 \leq 0.03,$$

where the constants  $\alpha$  and  $\tau$  are used to minimize the mean squared error. The constant  $T_S$  is equal to 203.451... ns, which equals one quarter of a PN chip. The values of coefficients  $h(k)$  are given in Table 6.1.3.1.10-1. Note that  $h(k)$  equals  $h(47 - k)$ .

1

**Table 6.1.3.1.10-1. Coefficients  $h(k)$** 

<b>k</b>	<b><math>h(k)</math></b>
0, 47	-0.025288315
1, 46	-0.034167931
2, 45	-0.035752323
3, 44	-0.016733702
4, 43	0.021602514
5, 42	0.064938487
6, 41	0.091002137
7, 40	0.081894974
8, 39	0.037071157
9, 38	-0.021998074
10, 37	-0.060716277
11, 36	-0.051178658
12, 35	0.007874526
13, 34	0.084368728
14, 33	0.126869306
15, 32	0.094528345
16, 31	-0.012839661
17, 30	-0.143477028
18, 29	-0.211829088
19, 28	-0.140513128
20, 27	0.094601918
21, 26	0.441387140
22, 25	0.785875640
23, 24	1.0

### 6.1.3.2 Access Channel

The Access Channel is used by the mobile station to initiate communication with the base station and to respond to Paging Channel messages. An Access Channel transmission is a coded, interleaved, and modulated spread-spectrum signal. The Access Channel is random-access (see 6.6.3.1.1). Access Channels are uniquely identified by their long codes (see 6.1.3.1.8).

#### 6.1.3.2.1 Access Channel Time Alignment and Modulation Rate

The mobile station shall transmit information on the Access Channel at a fixed data rate of 4800 bps. An Access Channel frame shall be 20 ms in length. An Access Channel frame shall begin only when System Time (see Figure 1.2-1) modulo 20 ms equals zero.

The synchronization, timing, and structure of the Access Channel are specified in 6.6.3.1.1 and 6.7.1.1.

The Reverse CDMA Channel may contain up to 32 Access Channels numbered 0 through 31 per supported Paging Channel. At least one Access Channel exists on the Reverse CDMA Channel for each Paging Channel on the corresponding Forward CDMA Channel. Each Access Channel is associated with a single Paging Channel.

#### 6.1.3.2.2 Access Channel Convolutional Encoding

The Access Channel data shall be convolutionally encoded prior to transmission as specified in 6.1.3.1.3.

When generating Access Channel data, the encoder shall be initialized to the all zero state at the end of each 20 ms frame.

#### 6.1.3.2.3 Access Channel Code Symbol Repetition

Each code symbol output from the convolutional encoder on the Access Channel shall be repeated once (each symbol occurs two consecutive times) as specified in 6.1.3.1.4.

#### 6.1.3.2.4 Access Channel Interleaving

The repeated code symbols on the Access Channel shall be interleaved as specified in 6.1.3.1.5.

#### 6.1.3.2.5 Access Channel Modulation

The Access Channel data shall be modulated as specified in 6.1.3.1.6.

#### 6.1.3.2.6 Access Channel Gating

The mobile station shall not gate off any power control group while transmitting on the Access Channel as specified in 6.1.3.1.7.1.

#### 6.1.3.2.7 Access Channel Direct Sequence Spreading

The Access Channel shall be spread by the long code as specified in 6.1.3.1.8.

#### 6.1.3.2.8 Access Channel Quadrature Spreading

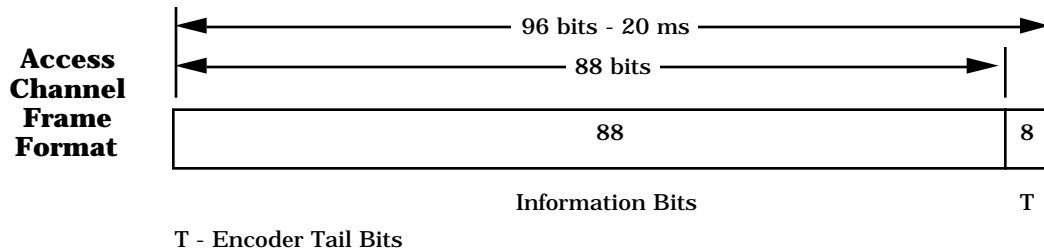
The Access Channel shall be quadrature spread by the pilot PN sequences as specified in 6.1.3.1.9.

#### 6.1.3.2.9 Access Channel Baseband Filtering

The Access Channel shall be filtered as specified in 6.1.3.1.10.

#### 6.1.3.2.10 Access Channel Frame Structure

Each Access Channel frame contains 96 bits (20 ms frame at 4800 bps). Each Access Channel frame shall consist of 88 information bits and eight Encoder Tail Bits (see Figure 6.1.3.2.10-1). The 8-bit CRC used for Reverse Traffic Channel frames at 4800 bps shall not be used.



**Figure 6.1.3.2.10-1. Access Channel Frame Structure**

#### 6.1.3.3 Reverse Traffic Channel

The Reverse Traffic Channel is used for the transmission of primary traffic, secondary traffic, and signaling traffic to the base station during a call.

##### 6.1.3.3.1 Reverse Traffic Channel Time Alignment and Modulation Rates

The mobile station shall transmit information on the Reverse Traffic Channel at a variable data rate of 9600, 4800, 2400, or 1200 bps. A Reverse Traffic Channel frame shall be fixed at 20 ms in length.

A zero-offset Reverse Traffic Channel frame shall begin only when System Time (see Figure 1.2-1) modulo 20 ms equals zero. A zero-offset Traffic Channel frame shall have the FRAME\_OFFSET parameter (see the *Channel Assignment Message* in 7.7.2.3.2.8) set to zero. A mobile station shall support staggered Traffic Channel frames. A staggered frame shall begin  $1.25 \times \text{FRAME\_OFFSET}$  ms later than the zero-offset Traffic Channel frame. The Reverse Traffic Channel interleaver block shall be aligned with the Reverse Traffic Channel frame.

##### 6.1.3.3.2 Reverse Traffic Channel Convolutional Encoding

The Reverse Traffic Channel data shall be convolutionally encoded prior to transmission as specified in 6.1.3.1.3.



1 When generating Reverse Traffic Channel data, the encoder shall be initialized to the all  
2 zero state at the end of each 20 ms frame.

### 3 6.1.3.3.3 Reverse Traffic Channel Code Symbol Repetition

4 Reverse Traffic Channel code symbol repetition shall be as specified in 6.1.3.1.4.

### 5 6.1.3.3.4 Reverse Traffic Channel Interleaving

6 The code symbols (or repeated code symbols when a data rate lower than 9600 bps is used)  
7 on the Reverse Traffic Channel shall be interleaved as specified in 6.1.3.1.5.

### 8 6.1.3.3.5 Reverse Traffic Channel Modulation

9 The Reverse Traffic Channel data shall be modulated as specified in 6.1.3.1.6.

### 10 6.1.3.3.6 Reverse Traffic Channel Gating

11 The mobile station shall perform the data burst randomizing function as specified in  
12 6.1.3.1.7 while transmitting on the Reverse Traffic Channel.

### 13 6.1.3.3.7 Reverse Traffic Channel Direct Sequence Spreading

14 The Reverse Traffic Channel shall be spread by the long code as specified in 6.1.3.1.8.

### 15 6.1.3.3.8 Reverse Traffic Channel Quadrature Spreading

16 The Reverse Traffic Channel shall be quadrature spread by the pilot PN sequences as  
17 specified in 6.1.3.1.9.

### 18 6.1.3.3.9 Reverse Traffic Channel Baseband Filtering

19 The Reverse Traffic Channel shall be filtered as specified in 6.1.3.1.10.

### 20 6.1.3.3.10 Reverse Traffic Channel Frame Structure

21 Reverse Traffic Channel frames sent at the 9600 bps transmission rate shall consist of 192  
22 bits. These 192 bits shall be composed of 172 information bits followed by 12 frame quality  
23 indicator (CRC) bits and eight Encoder Tail Bits as shown in Figure 6.1.3.3.10-1.

24 Reverse Traffic Channel frames sent at the 4800 bps transmission rate shall consist of 96  
25 bits. These 96 bits shall be composed of 80 information bits followed by eight frame quality  
26 indicator (CRC) bits and eight Encoder Tail Bits as shown in Figure 6.1.3.3.10-1.

27 Reverse Traffic Channel frames sent at the 2400 bps transmission rate shall consist of 48  
28 bits. These 48 bits shall be composed of 40 information bits followed by eight Encoder Tail  
29 Bits as shown in Figure 6.1.3.3.10-1.

30 Reverse Traffic Channel frames sent at the 1200 bps transmission rate shall consist of 24  
31 bits. These 24 bits shall be composed of 16 information bits followed by eight Encoder Tail  
32 Bits as shown in Figure 6.1.3.3.10-1.

33 The number of bits in the frame and the frame format (see 6.1.3.3.11) shall be variable on a  
34 frame-by-frame basis.



**Figure 6.1.3.3.10-1. Reverse Traffic Channel Frame Structure**

#### 6.1.3.3.10.1 Reverse Traffic Channel Frame Quality Indicator

Each 9600 bps and 4800 bps frame shall include a frame quality indicator. This frame quality indicator is a CRC.<sup>10</sup> No frame quality indicator is used for the 2400 bps and 1200 bps transmission rates.

For both the 9600 bps and 4800 bps rates, the frame quality indicator shall be calculated on all bits within the frame, except the frame quality indicator itself and the Encoder Tail Bits. The 9600 bps transmission rate shall use a 12-bit frame quality indicator. The generator polynomial for this frame quality indicator shall be as follows:

$$g(x) = x^{12} + x^{11} + x^{10} + x^9 + x^8 + x^4 + x + 1.$$

The 4800 bps transmission rate shall use an 8-bit frame quality indicator. The generator polynomial for this frame quality indicator shall be as follows:

$$g(x) = x^8 + x^7 + x^4 + x^3 + x + 1.$$

The CRCs shall be computed according to the following procedure using the logic shown in Figures 6.1.3.3.10.1-1 and 6.1.3.3.10.1-2:

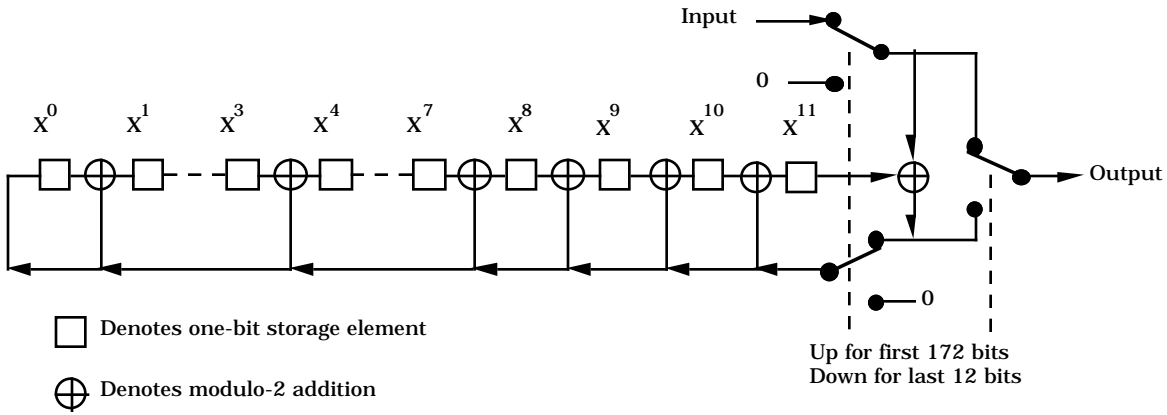
- Initially, all shift register elements shall be set to logical one and the switches shall be set in the up position.
- The register shall be clocked 172 times (for 192-bit frame) or 80 times (for 96-bit frame) with the information bits as input.
- The switches shall be set in the down position, and the register shall be clocked an additional 12 times (for 192-bit frame) or 8 times (for 96-bit frame). The 12 or 8 additional output bits shall be the check bits.
- The bits shall be transmitted in the order calculated.

#### 6.1.3.3.10.2 Reverse Traffic Channel Encoder Tail Bits

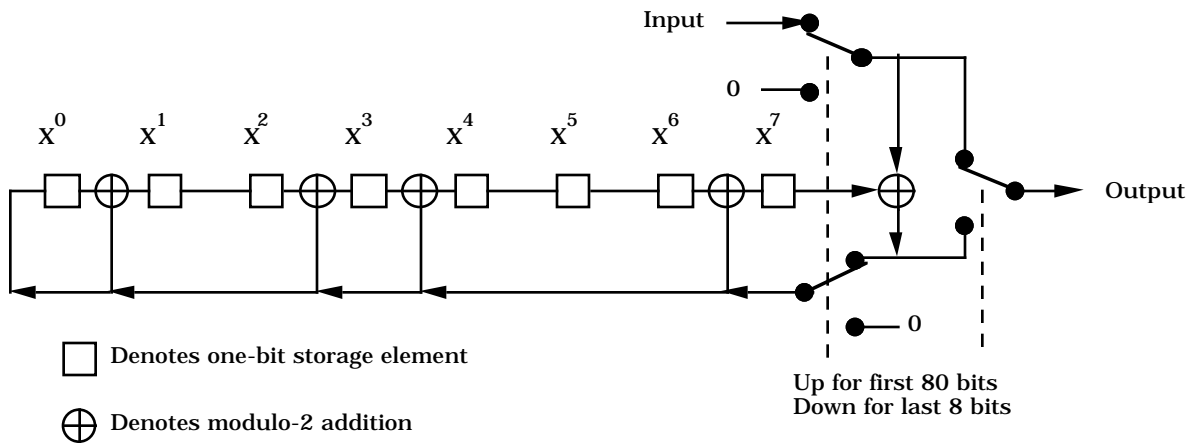
The last 8 bits of each Reverse Traffic Channel frame are called the Encoder Tail Bits. These 8 bits shall be set to '0'. The mobile station shall not include these bits in the computation of the 9600 and 4800 bps frame quality indicators.

---

<sup>10</sup>The frame quality indicator supports two functions at the receiver. The first function is to determine the transmission rate of the frame; the second is to determine whether the frame is in error.



**Figure 6.1.3.3.10.1-1. Reverse Traffic Channel Frame Quality Indicator Calculation at the 9600 bps Rate**



**Figure 6.1.3.3.10.1-2. Reverse Traffic Channel Frame Quality Indicator Calculation at the 4800 bps Rate**

#### 6.1.3.3.10.3 Traffic Channel Preamble

The Traffic Channel preamble shall consist of frames of 192 zeros that are transmitted at the 9600 bps rate. The Traffic Channel preamble shall not include the frame quality indicator.

The Traffic Channel preamble is transmitted to aid the base station in performing initial acquisition of the Reverse Traffic Channel. The Traffic Channel preamble transmission occurs after the mobile station's transmitter has been enabled during the *Traffic Channel Initialization Substate* of the *Mobile Station Control on the Traffic Channel State* and before receipt of the first valid message on the Forward Traffic Channel (see 6.6.4.2).

#### 6.1.3.3.10.4 Null Traffic Channel Data

Null Traffic Channel data shall consist of frames of 16 ones followed by 8 zeros (the Encoder Tail Bits) sent at the 1200 bps rate.

The mobile station transmits null Traffic Channel data when no service option is active. Typically this occurs for a mobile station terminated call when the mobile station is in either the *Waiting for Order Substate* or the *Waiting for Mobile Station Answer Substate* of the *Mobile Station Control on the Traffic Channel State*. Null Traffic Channel data serves as a "keep-alive" operation so that the base station can maintain synchronization with the mobile station.

#### 6.1.3.3.11 Multiplex Option 1 Information Bits

Multiplex Option 1 is also referred to as the default multiplex option.<sup>11</sup> It provides for the transmission of primary traffic and signaling traffic. Signaling traffic may be transmitted via blank-and-burst with the signaling traffic using all of the frame or via dim-and-burst with the primary traffic and signaling traffic sharing the frame. Multiplex Option 1 also supports the transmission of secondary traffic. When primary traffic is active, secondary traffic is transmitted via dim-and-burst with the primary traffic and secondary traffic sharing the frame. When primary traffic is not active, secondary traffic is transmitted via blank-and-burst with the secondary traffic using all of the frame. The information bit structures for primary and signaling traffic are specified in 6.1.3.3.11.1; the information bit structures for secondary traffic are specified in 6.1.3.3.11.2. Table 6.1.3.3.11-1 shows the information bit structures supported by Multiplex Option 1.

The mobile station shall support Multiplex Option 1. The mobile station shall support the transmission of primary traffic and signaling traffic using the information bit structures specified in 6.1.3.3.11.1. The mobile station may support secondary traffic, and if so, the mobile station shall also use the information bit structures specified in 6.1.3.3.11.2.

---

<sup>11</sup>The multiplex option is the same on both the Forward Traffic Channel and the Reverse Traffic Channel.

**Table 6.1.3.3.11-1. Reverse Traffic Channel Information Bits for Multiplex Option 1**

<b>Transmit Rate</b> (bits/sec)	<b>Format Bits</b>				<b>Primary Traffic</b>		<b>Signaling Traffic</b>		<b>Secondary Traffic</b>	
	<b>Mixed Mode (MM)</b>	<b>Burst Format (BF)</b>	<b>Traffic Type (TT)</b>	<b>Traffic Mode (TM)</b>	bits/frame	bits/sec	bits/frame	bits/sec	bits/frame	bits/sec
<b>9600</b> *	0	–	–	–	171	8550	0	0	0	0
	1	0	0	00	80	4000	86	4300	0	0
	1	0	0	01	40	2000	126	6300	0	0
	1	0	0	10	16	800	150	7500	0	0
	1	1	0	–	0	0	168	8400	0	0
	1	1	1	–	0	0	0	0	169	8450
	1	0	1	00	80	4000	0	0	87	4350
	1	0	1	01	40	2000	0	0	127	6350
	1	0	1	10	16	800	0	0	151	7550
<b>4800</b>	–	–	–	–	80	4000	0	0	0	0
<b>2400</b>	–	–	–	–	40	2000	0	0	0	0
<b>1200</b>	–	–	–	–	16	800	0	0	0	0

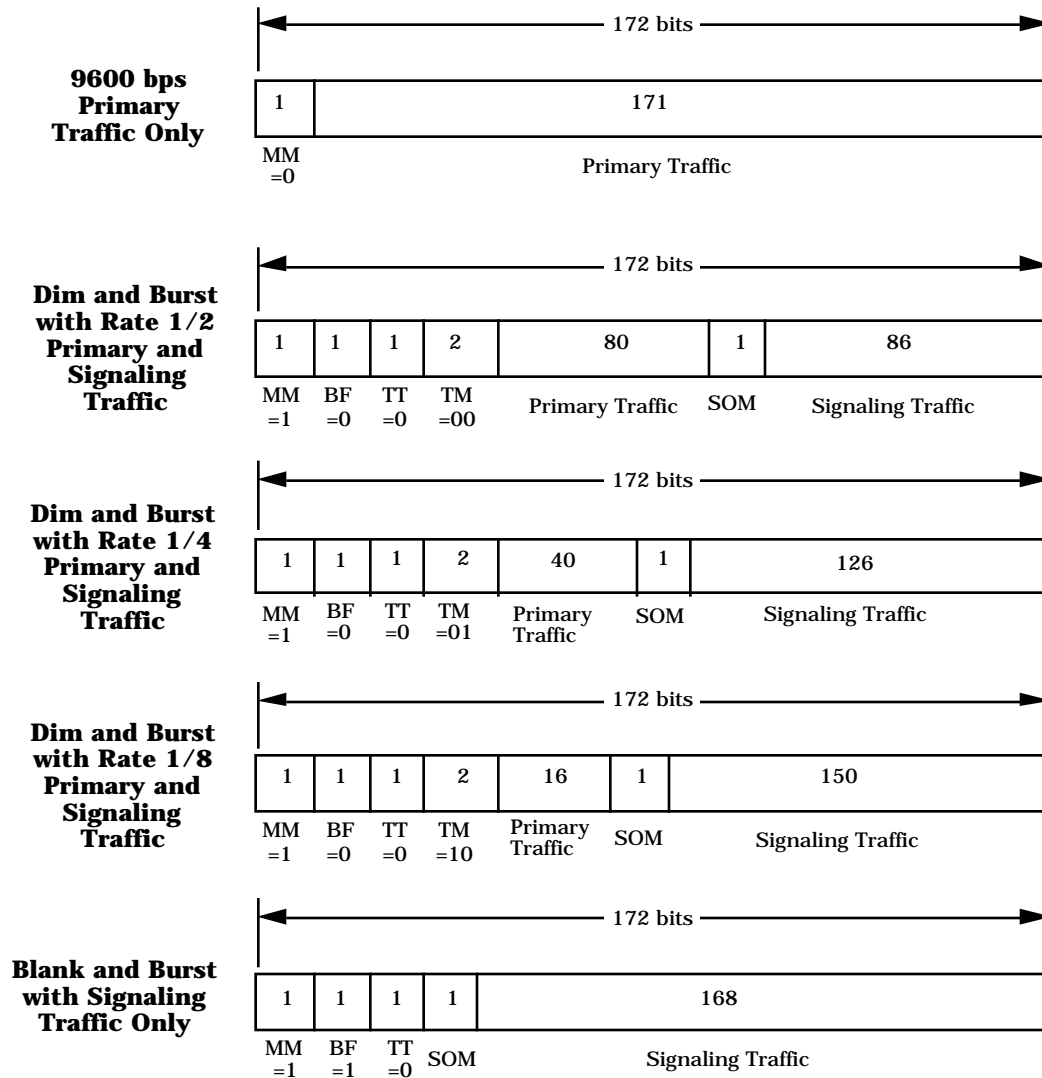
Notes: Secondary traffic structures, marked with \*, are optional.

Signaling traffic bits do not include the SOM bit.

#### 6.1.3.3.11.1 Primary and Signaling Traffic with Multiplex Option 1

The mobile station shall support the information bit structures described in Table 6.1.3.3.11-1 and Figure 6.1.3.3.11.1-1.

For signaling traffic, the first bit of the frame's signaling portion shall be a SOM (Start of Message) Bit. The SOM Bit shall be a '1' if a Reverse Traffic Channel message (signaling message) begins at the following bit. A Reverse Traffic Channel message capsule shall not begin anywhere else in the frame. The SOM Bit shall be a '0' if a message does not begin at the following bit. This occurs if the frame contains part of a message that began in a previous frame.

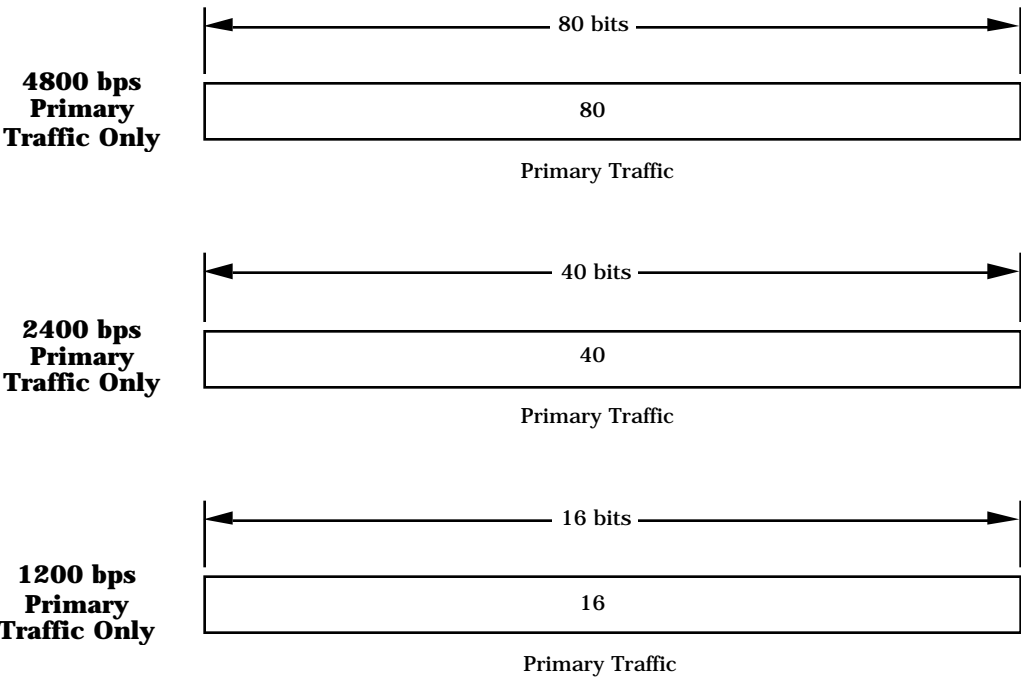


### Notation

MM - Mixed Mode Bit  
 0 - Primary Traffic Only  
 1 - Primary Traffic and/or Signaling/Secondary Traffic  
 BF - Burst Format Bit  
 0 - Dim-and-burst  
 1 - Blank-and-burst  
 TT - Traffic Type Bit  
 0 - Signaling  
 1 - Secondary

TM - Traffic Mode Bits  
 00 - 80 Primary Traffic Bits and either 86 Signaling Traffic or 87 Secondary Traffic Bits  
 01 - 40 Primary Traffic Bits and either 126 Signaling Traffic Bits or 127 Secondary Traffic Bits  
 10 - 16 Primary Traffic Bits and either 150 Signaling Traffic Bits or 151 Secondary Traffic Bits  
 11 - Reserved  
 SOM - Start of Message Bit  
 0 - Message does not begin at the following bit  
 1 - Message begins at the following bit

**Figure 6.1.3.3.11.1-1. Information Bits for Primary Traffic and Signaling Traffic (Part 1 of 2)**



Notation

- MM - Mixed Mode Bit

0 - Primary Traffic Only

1 - Primary Traffic and/or Signaling/Secondary Traffic

BF - Burst Format Bit

0 - Dim-and-burst

1 - Blank-and-burst

TT - Traffic Type Bit

0 - Signaling

1 - Secondary
- TM - Traffic Mode Bits

00 - 80 Primary Traffic Bits and either 86 Signaling Traffic or 87 Secondary Traffic Bits

01 - 40 Primary Traffic Bits and either 126 Signaling Traffic Bits or 127 Secondary Traffic Bits

10 - 16 Primary Traffic Bits and either 150 Signaling Traffic Bits or 151 Secondary Traffic Bits

11 - Reserved

SOM - Start of Message Bit

0 - Message does not begin at the following bit

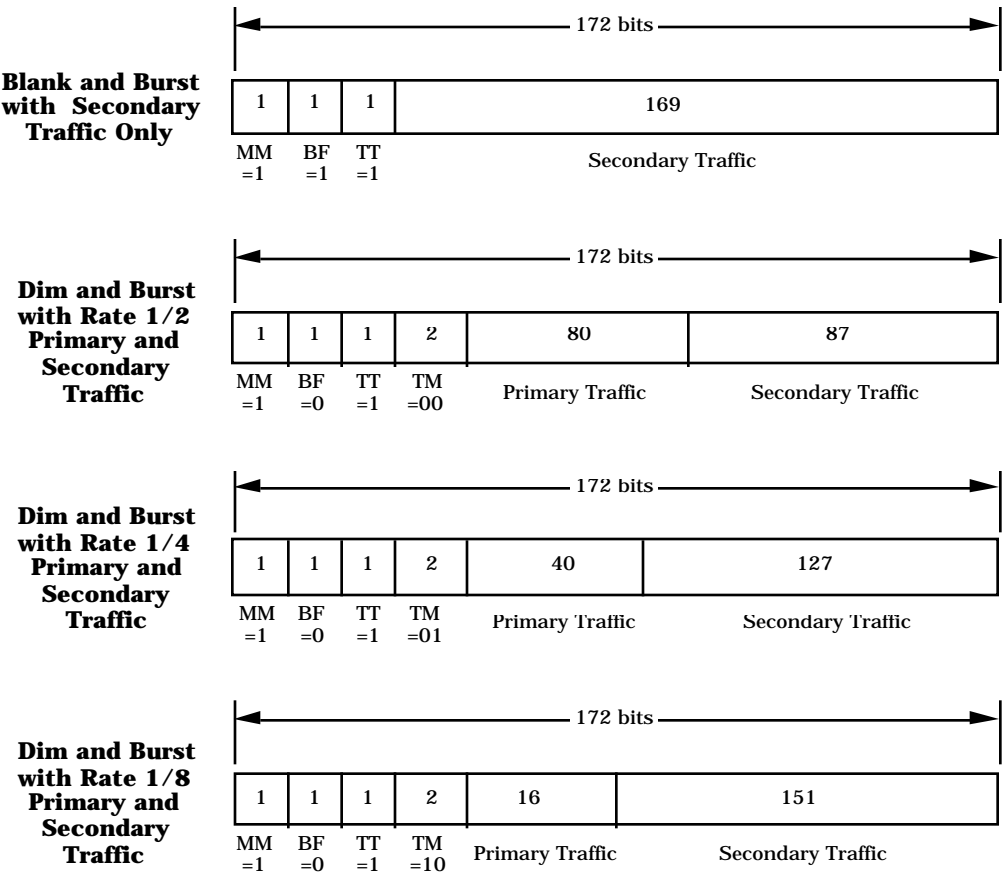
1 - Message begins at the following bit

Figure 6.1.3.3.11.1-1. Information Bits for Primary Traffic and Signaling Traffic (Part 2 of 2)



6.1.3.3.11.2 Secondary Traffic with Multiplex Option 1

If the mobile station supports secondary traffic, the mobile station shall use the information bit structures described in Table 6.1.3.3.11-1 and Figure 6.1.3.3.11.2-1.



Notation

- MM - Mixed Mode Bit

0 - Primary Traffic Only

1 - Primary Traffic and/or Signaling/Secondary Traffic

BF - Burst Format Bit

0 - Dim-and-burst

1 - Blank-and-burst

TT - Traffic Type Bit

0 - Signaling

1 - Secondary
- TM - Traffic Mode Bits

00 - 80 Primary Traffic Bits and either 86 Signaling Traffic or 87 Secondary Traffic Bits

01 - 40 Primary Traffic Bits and either 126 Signaling Traffic Bits or 127 Secondary Traffic Bits

10 - 16 Primary Traffic Bits and either 150 Signaling Traffic Bits or 151 Secondary Traffic Bits

11 - Reserved

SOM - Start of Message Bit

0 - Message does not begin at the following bit

1 - Message begins at the following bit

Figure 6.1.3.3.11.2-1. Information Bits for Secondary Traffic

### 6.1.3.3.11.3 Use of Various Information Bit Formats

When neither a primary traffic service option nor a secondary traffic service option is active, the mobile station shall transmit signaling traffic using only blank-and-burst frames. When not transmitting signaling traffic, the mobile station shall transmit only null Traffic Channel data frames.

When a primary traffic service option is active and a secondary traffic service option is not active, the mobile station shall use the information formats specified in 6.1.3.3.11.1. The mobile station shall not transmit null Traffic Channel data. The mobile station should use the dim-and-burst information format specified in 6.1.3.3.11.1 for signaling traffic.

When a primary traffic service option is not active and a secondary traffic service option is active, the mobile station shall use the information formats specified in 6.1.3.3.11.2 to transmit secondary traffic. The mobile station shall use the blank-and-burst format specified in 6.1.3.3.11.1 for signaling traffic. The mobile station shall transmit null Traffic Channel data when neither secondary traffic nor signaling traffic is to be sent.

When both a primary traffic service option and a secondary traffic service option are active, the mobile station shall use the information formats specified in 6.1.3.3.11.1 and 6.1.3.3.11.2. The mobile station shall not transmit null Traffic Channel data. The mobile station should use the dim-and-burst information format specified in 6.1.3.3.11.1 for signaling traffic.

### 6.1.3.3.11.4 Control of Service Options

Multiplex Option 1 controls the number of bits that the connected service options supplies for a frame (see Appendix A).

The mobile station shall use the following rules when a primary traffic service option is active: If signaling traffic is to be transmitted in a frame, Multiplex Option 1 shall either restrict the primary traffic service option to generate zero bits (for a blank-and-burst frame) or to generate less than 171 bits (for a dim-and-burst frame). If secondary traffic is to be transmitted in a frame, Multiplex Option 1 may restrict the primary traffic service option to generate less than 171 bits but shall allow the primary traffic service option to generate at least 16 bits. In all other cases, Multiplex Option 1 shall allow the primary traffic service option to generate either 16, 40, 80, or 171 bits for a frame.

## 6.1.4 Limitations on Emissions

### 6.1.4.1 Bandwidth Occupied

Modulation products in a bandwidth of 30 kHz centered  $\pm 750$  kHz from the channel center frequency should be at least 45 dB and shall be at least 42 dB below the mean output power level.

#### 6.1.4.2 Conducted Spurious Emissions

##### 6.1.4.2.1 Suppression Inside Cellular Band

When transmitting on any CDMA Channel, spurious emission levels in the mobile station transmit band between 824 and 849 MHz shall be less than the limits specified in Table 6.1.4.2.1-1.

In addition, spurious emissions in each 1.23 MHz band located anywhere in the mobile station receive band between 869 and 894 MHz shall be less than -80 dBm. These requirements shall apply to measurements made at the mobile station antenna connector.

**Table 6.1.4.2.1-1. Spurious Emission Limits When Transmitting**

For Frequency $f$ , with $ f - \text{Center Frequency} $	Greater than 780 kHz	Greater than 1.98 MHz
Spurious emission levels shall be less than either (a), or both (b) and (c)	(a) -42 dBc/30 kHz	(a) -54 dBc/30 kHz
	(b) -60 dBm/30 kHz	
	(c) -54 dBm/1.23 MHz	
Spurious emission levels should be less than either (a), or both (b) and (c)	(a) -45 dBc/30 kHz	(a) -60 dBc/30 kHz
	(b) -66 dBm/30 kHz	
	(c) -60 dBm/1.23 MHz	

Note: All frequencies in the measurement bandwidth shall satisfy the restrictions on  $|f - \text{Center Frequency}|$ .

##### 6.1.4.2.2 Suppression Outside Cellular Band

Current FCC rules shall apply.

#### 6.1.4.3 Radiated Spurious Emissions

Radiated spurious emissions (from sources other than the antenna connector) shall meet levels corresponding to the conducted spurious requirements listed in 6.1.4.2.

#### 6.1.5 Synchronization and Timing

##### 6.1.5.1 Time Reference

Figure 1.2-1 illustrates the nominal relationship between the mobile station and base station transmit and receive time references. The mobile station shall establish a time reference which is used to derive timing for the transmit chip, symbol, frame slot, and system timing. The mobile station time reference shall be synchronized to the time of occurrence, as measured at the mobile station antenna connector, of the earliest arriving multipath component being used for demodulation. If another multipath component (belonging to the same Pilot Channel or to a different Pilot Channel) becomes the earliest

arriving multipath component to be used, the mobile station time reference shall track to the new component.

When receiving the Forward Traffic Channel, the mobile station time reference shall be used to determine the transmit timing of the Reverse Traffic Channel. When receiving the Paging Channel, the mobile station time reference shall be used to determine the transmit timing of the Access Channel.

The mobile station transmit time (see Figure 1.2-1) as measured at the mobile station antenna connector shall be maintained within  $\pm 1 \mu\text{s}$  of the time of occurrence, as measured at the mobile station antenna connector, of the earliest arriving multipath component being used for demodulation.

If a new multipath component becomes the earliest arriving multipath component used for demodulation, the mobile station time reference shall be corrected by no faster than  $1/4$  chip (203.451 ns) in any 200 ms period and no slower than 300 ns per second.

#### 6.1.5.2 PN Time Tolerance

The time error between the long code timing and the 64-ary Walsh symbol sequence timing shall be less than  $\pm 50$  ns.

#### 6.1.6 Transmitter Performance Requirements

System performance is predicated on transmitters meeting the requirements set forth in the document titled "Recommended Minimum Performance Standards for 800 MHz Wideband Spread Spectrum Dual-Mode Mobile Stations."

### 6.2 Receiver

#### 6.2.1 Frequency Parameters

##### 6.2.1.1 Channel Spacing and Designation

Channel spacing and designation for the mobile station reception shall be as specified in 2.1.1.1. Valid channels for CDMA operations shall be as specified in 6.1.1.1.

#### 6.2.2 Demodulation Characteristics

##### 6.2.2.1 Processing

The mobile station demodulation process shall perform complementary operations to the base station modulation process on the Forward CDMA Channel (see 7.1.3).

##### 6.2.2.2 Forward Traffic Channel Frame Categorization

The multiplex sublayer in the mobile station shall classify received Forward Traffic Channel frames into the following 14 categories (see 7.1.3.5.11):

1. 9600 bps frame, primary traffic only
2. 9600 bps frame, dim-and-burst with Rate  $1/2$  primary and signaling traffic

- 1        3.    9600 bps frame, dim-and-burst with Rate 1/4 primary and signaling traffic
- 2        4.    9600 bps frame, dim-and-burst with Rate 1/8 primary and signaling traffic
- 3        5.    9600 bps frame, blank-and-burst with signaling traffic only
- 4        6.    4800 bps frame, primary traffic only
- 5        7.    2400 bps frame, primary traffic only
- 6        8.    1200 bps frame, primary traffic or null data only
- 7        9.    9600 bps frame, primary traffic only, with probable bit errors<sup>12</sup>
- 8        10. Frame quality insufficient to decide upon rate
- 9        11. 9600 bps frame, dim-and-burst with Rate 1/2 primary and secondary traffic
- 10       12. 9600 bps frame, dim-and-burst with Rate 1/4 primary and secondary traffic
- 11       13. 9600 bps frame, dim-and-burst with Rate 1/8 primary and secondary traffic
- 12       14. 9600 bps frame, blank-and-burst with secondary traffic only

13       Frames in categories 9 and 10 are bad frames; all frames otherwise categorized are  
14       considered good frames.

15       The Forward Traffic Channel frame classification shall be done for each frame via frame  
16       quality indicator (CRC checks, available for 9600 and 4800 bps frames), decoder quality  
17       information, and the Mixed Mode Bit, Burst Format Bit, Traffic Type Bit, and Traffic Mode  
18       Bits. If primary traffic is active and secondary traffic is not active, then the mobile station  
19       shall categorize the received frames into one of categories 1 through 10. If primary traffic is  
20       not active and secondary traffic is active, then the mobile station shall categorize the  
21       received frames into one of categories 5, 8, 10 and 14. If neither primary traffic nor  
22       secondary traffic is active, then the mobile station shall categorize the received frames into  
23       one of categories 5, 8, and 10. Mobile stations that do not implement secondary traffic  
24       services are not required to implement categories 11 through 14.

### 25       6.2.2.3 Forward Traffic Channel Time Alignment

26       The Forward Traffic Channel frame time alignment is specified in 7.1.3.5.1. A mobile  
27       station shall support staggered Forward Traffic Channel frames.

### 28       6.2.3 Limitations on Emissions

#### 29       6.2.3.1 Conducted Spurious Emissions

##### 30       6.2.3.1.1 Suppression Inside Cellular Band

31       Total spurious emissions in each 1.23 MHz band located in the mobile station's receive  
32       band between 869 and 894 MHz shall not exceed -80 dBm. Total spurious emissions in

---

<sup>12</sup>Certain service options, which can be connected to the multiplex sublayer, can satisfactorily handle some bit errors.

each 1.23 MHz band located in the mobile station's transmit band between 824 and 849 MHz shall not exceed -60 dBm. These requirements shall apply to measurements made at the mobile station antenna connector, with the transmitter disabled.

#### 6.2.3.1.2 Suppression Outside Cellular Band

Current FCC rules shall apply.

#### 6.2.3.2 Radiated Spurious Emissions

Current FCC rules shall apply.

#### 6.2.4 Receiver Performance Requirements

System performance is predicated on receivers meeting the requirements set forth in the document titled "Recommended Minimum Performance Standards for 800 MHz Wideband Spread Spectrum Dual-Mode Mobile Stations."

### 6.3 Security and Identification

#### 6.3.1 Mobile Station Identification Number

See 2.3.1.

#### 6.3.2 Electronic Serial Number

See 2.3.2.

#### 6.3.3 Station Class Mark

See 2.3.3.

#### 6.3.4 Registration Memory

See 2.3.4 for registration memory when operating in the analog mode.

The mobile station shall have memory to store one element in the zone-based registration list `ZONE_LISTs-p` (see 6.6.5.1.5). This stored element shall include both `REG_ZONE` and the corresponding (SID, NID) pair. The data retention time under power-off conditions shall be at least 48 hours. If, after 48 hours, the data integrity cannot be guaranteed, then the entry in `ZONE_LISTs-p` shall be deleted upon power-on.

The mobile station shall have memory to store one element in the system/network registration list `SID_NID_LISTs-p` (see 6.6.5.1.5). The data retention time under power-off conditions shall be at least 48 hours. If, after 48 hours, the data integrity cannot be guaranteed, then the entry in `SID_NID_LISTs-p` shall be deleted upon power-on.

The mobile station shall have memory to store the distance-based registration variables `BASE_LAT_REGs-p`, `BASE_LONG_REGs-p`, and `REG_DIST_REGs-p` (see 6.6.5.1.4). The data retention time under power-off conditions shall be at least 48 hours. If, after 48 hours, the data integrity cannot be guaranteed, then `REG_DIST_REGs-p` shall be set to zero upon power-on.

### 6.3.5 Access Overload Class

See 2.3.5.

### 6.3.6 Reserved

### 6.3.7 Reserved

### 6.3.8 Home System and Network Identification

In addition to the HOME\_SID<sub>p</sub> parameter that the mobile station stores for each MIN that can be associated with the mobile station (see 2.3.8), the mobile station shall provide memory to store at least one home (SID<sub>p</sub>, NID<sub>p</sub>) pair for each MIN that can be associated with the mobile station. The mobile station shall also provide memory to store the 1-bit parameters MOB\_TERM\_HOME<sub>p</sub>, MOB\_TERM\_FOR\_SID<sub>p</sub>, and MOB\_TERM\_FOR\_NID<sub>p</sub> for each MIN that can be associated with the mobile station (see 6.6.5.3).

### 6.3.9 Local Control Option

See 2.3.9.

### 6.3.10 Preferred Operation Selection

#### 6.3.10.1 Preferred System

See 2.3.10.1.

#### 6.3.10.2 Preferred CDMA or Analog

See 2.3.10.2.

### 6.3.11 Discontinuous Reception

The mobile station shall provide memory to store the preferred slot cycle index, SLOT\_CYCLE\_INDEX<sub>p</sub> (see 6.6.2.1.1.3).

### 6.3.12 Authentication, Encryption of Signaling Information/User Data and Voice Privacy

#### 6.3.12.1 Authentication

Authentication is the process by which information is exchanged between a mobile station and base station for the purpose of confirming the identity of the mobile station. The intent of the authentication process is to demonstrate that the mobile station and base station possess identical sets of Shared Secret Data (SSD). During the authentication process, the mobile station processes all messages received, whether related to authentication or not.

##### 6.3.12.1.1 Shared Secret Data (SSD)

SSD is a 128-bit quantity that is stored in semi-permanent memory in the mobile station, as specified in 2.3.12.1.1.

SSD\_A is used to support the authentication procedures and SSD\_B is used to support voice privacy and message encryption. SSD is generated according to the procedure specified in 2.3.12.1.8 or 6.3.12.1.9.

#### 6.3.12.1.2 Random Challenge Memory (RAND)

See 2.3.12.1.2.

#### 6.3.12.1.3 Call History Parameter (COUNT)

See 2.3.12.1.3.

#### 6.3.12.1.4 Authentication of Mobile Station Registrations

The following authentication procedures shall be performed when the AUTH field of the *Access Parameters Message* is set to '01' (standard authentication mode), and the mobile station attempts to register (by sending an *Initial Registration Message* on the Access Channel) or to update its registration (by sending a *Registration Update Message* on the Access Channel):

The mobile station shall initialize the authentication algorithm (CAVE) as illustrated in Figure 6.3.12.1.4-1. If more than one MIN is specified in the message, the CAVE algorithm shall be initialized using the first MIN in the message, whether added or deleted. If the message contains no MIN, the CAVE algorithm shall be initialized using the least significant 24 bits of the ESN in place of MIN1.

The mobile station shall then execute the CAVE algorithm (see 2.3.12.1.9). The 18-bit output of CAVE shall be used to fill the AUTHR field of the *Initial Registration Message* or *Registration Update Message*, as appropriate. The RANDC (eight most significant bits of RAND) and COUNT fields of the message shall be filled with the current values stored in the mobile station.

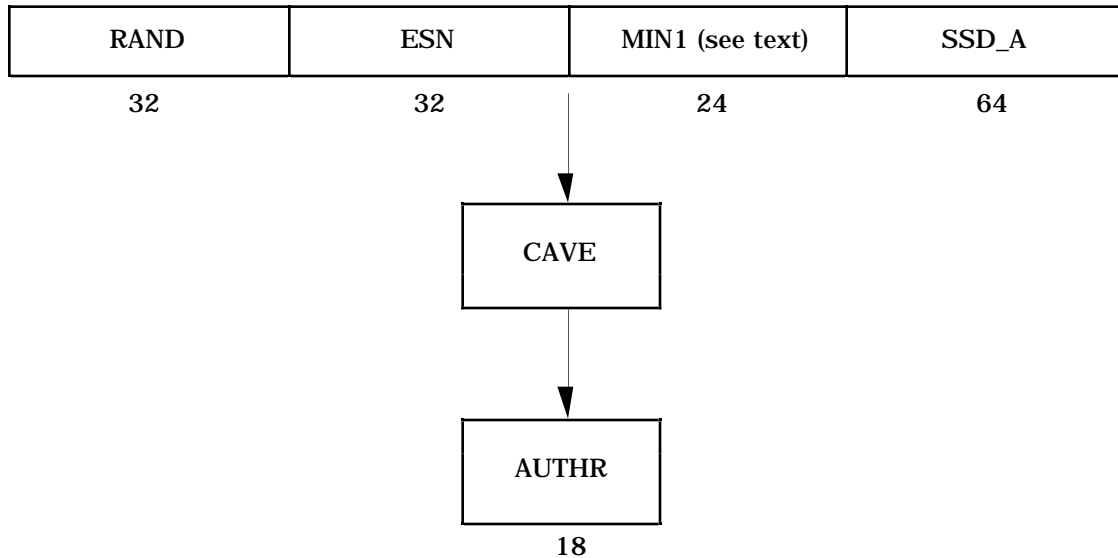
The base station computes the value of AUTHR using its internally stored value of SSD\_A. The base station compares its computed value of AUTHR to the value received from the mobile station.

The base station also compares the received value of RANDC to the most significant eight bits of its internally stored value of RAND.

The base station may also compare the received value of COUNT with its internally stored value associated with the received MIN/ESN.

If any of the comparisons fail, the base station may deem the registration attempt unsuccessful, initiate the Unique Challenge-Response Procedure (see 6.3.12.1.5) or commence the process of updating SSD (see 6.3.12.1.9).





**Figure 6.3.12.1.4-1. Computation of AUTHR for Authentication of Mobile Station Registrations**

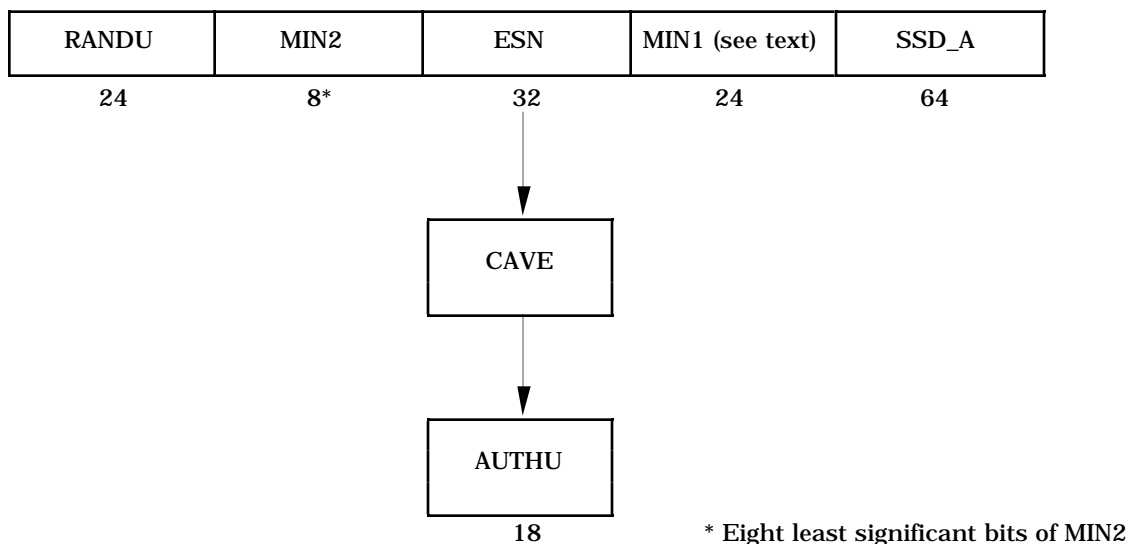
#### 6.3.12.1.5 Unique Challenge-Response Procedure

The Unique Challenge-Response Procedure is initiated by the base station and can be carried out over either on the Paging Channel and Access Channel, or on the Forward Traffic Channel and Reverse Traffic Channel. The procedure is as follows:

The base station generates the 24-bit quantity RANDU and sends it to the mobile station in the *Authentication Challenge Message* on either the Paging Channel or the Forward Traffic Channel. Upon receipt of the *Authentication Challenge Message*, the mobile station shall initialize the authentication algorithm (CAVE) as illustrated in Figure 6.3.12.1.5-1. On the Paging Channel, the *Authentication Challenge Message* contains the MIN and ESN of the mobile station being challenged. On the Forward Traffic Channel, the *Authentication Challenge Message* does not contain the MIN and ESN; the MIN and ESN used by both the base station and the mobile station shall be the MIN and ESN used to establish the call.

The mobile station shall then execute the CAVE algorithm (see 2.3.12.1.9). The 18-bit output of CAVE shall be used to fill the AUTHU field of the *Authentication Challenge Response Message*, which shall be sent to the base station.

The base station computes the value of AUTHU using its internally stored value of SSD\_A. The base station compares its computed value of AUTHU to the value received from the mobile station. If the comparison fails, the base station may deny further access attempts by the mobile station, drop the call in progress, or initiate the process of updating SSD (see 6.3.12.1.9).



**Figure 6.3.12.1.5-1. Computation of AUTHU for the Unique Challenge-Response Procedure**

#### 6.3.12.1.6 Authentication of Mobile Station Originations

When the AUTH field of the *Access Parameters Message* sent on the Paging Channel is set to '01' (standard authentication mode), and the mobile station attempts to originate a call (by sending an *Origination Message* on the Access Channel), the following authentication procedures shall be performed:

The mobile station shall initialize the authentication algorithm (CAVE) as illustrated in Figure 6.3.12.1.6-1. The DIGITS field shall contain the least significant four bits of each of the last six digits contained in the *Origination Message*. If fewer than six digits are included in the *Origination Message*, the most significant bits of MIN1 shall be used to replace the missing digits.

The mobile station shall then execute the CAVE algorithm (see 2.3.12.1.9). The 18-bit output of CAVE shall be used to fill the AUTHR field of the *Origination Message*. The RANDC (eight most significant bits of RAND) and COUNT fields of the message shall be filled with the current values stored in the mobile station.

The base station computes the value of AUTHR using its internally stored value of SSD\_A. The base station compares its computed value of AUTHR to the value received from the mobile station.

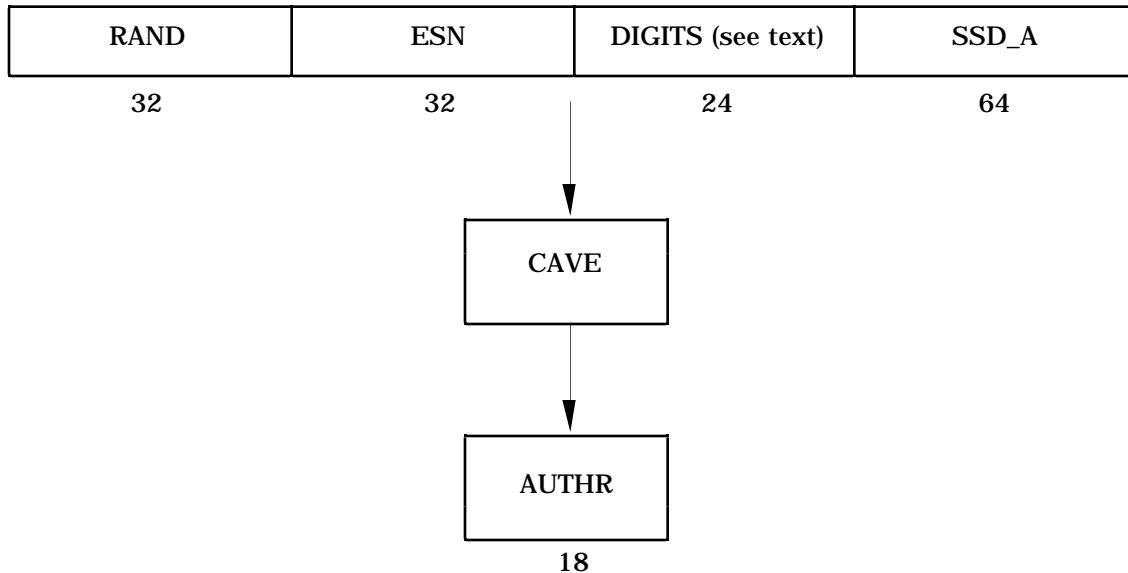
The base station also compares the received value of RANDC to the most significant eight bits of its internally stored value of RAND.

The base station may also compare the received value of COUNT with its internally stored value associated with the received MIN/ESN.

If the comparisons executed at the base station are successful, the base station initiates the appropriate channel assignment procedures. After channel assignment, the base station

may issue a *Set Parameters Message* on the Forward Traffic Channel, modifying the value of COUNT in the mobile station.

If any of the comparisons fail, the base station may deny service, initiate the Unique Challenge-Response Procedure (see 6.3.12.1.5) or commence the process of updating SSD (see 6.3.12.1.9).



**Figure 6.3.12.1.6-1. Computation of AUTHR for Authentication of Mobile Station Originations**

#### 6.3.12.1.7 Authentication of Mobile Station Terminations

When the AUTH field of the *Access Parameters Message* sent on the Paging Channel is set to '01' (standard authentication mode), and the mobile station responds to a page (by sending a *Page Response Message* on the Access Channel), the following authentication procedures shall be performed:

The mobile station shall initialize the authentication algorithm (CAVE) as illustrated in Figure 6.3.12.1.7-1. MIN1 shall be as specified in the *Page Response Message*.

The mobile station shall then execute the CAVE algorithm (see 2.3.12.1.9). The 18-bit output of CAVE shall be used to fill the AUTHR field of the *Page Response Message*. The RANDC (eight most significant bits of RAND) and COUNT fields of the message shall be filled with the current values stored in the mobile station.

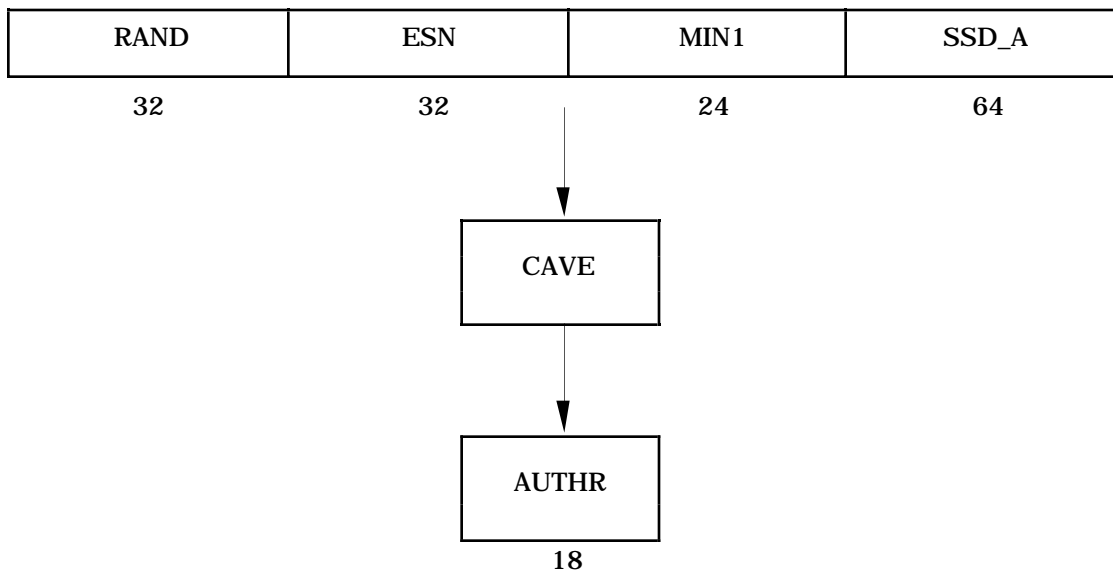
The base station computes the value of AUTHR using its internally stored value of SSD\_A. The base station compares its computed value of AUTHR to the value received from the mobile station.

The base station also compares the received value of RANDC to the eight most significant bits of its internally stored value of RAND.

The base station may also compare the received value of COUNT with its internally stored value associated with the received MIN/ESN.

If the comparisons executed at the base station are successful, the base station may initiate the appropriate channel assignment procedures. After channel assignment, the base station may issue a *Set Parameters Message* on the Forward Traffic Channel, modifying the value of COUNT in the mobile station.

If any of the comparisons fail, the base station may deny service, initiate the Unique Challenge Response Procedure (see 6.3.12.1.5) or commence the process of updating SSD (see 6.3.12.1.9).



**Figure 6.3.12.1.7-1. Computation of AUTHR for Authentication of Mobile Station Terminations**

#### 6.3.12.1.8 Authentication of Mobile Station Data Bursts

When the AUTH field of the *Access Parameters Message* sent on the Paging Channel is set to '01' (standard authentication mode), and the mobile station attempts to send a *Data Burst Message* on the Access Channel, the following authentication procedures shall be performed:

The mobile station shall initialize the authentication algorithm (CAVE) as illustrated in Figure 6.3.12.1.8-1. The CHARS field shall contain the least significant four bits of each of the last six characters contained in the *Data Burst Message*. If fewer than six characters are included in the *Data Burst Message*, the most significant bits of MIN1 shall be used to replace the missing characters.

The mobile shall then execute the CAVE algorithm (see 2.3.12.1.9). The 18-bit output of CAVE shall be used to fill the AUTHR field of the *Data Burst Message*. The RANDC (eight

most significant bits of RAND) and COUNT fields of the message shall be filled with the current values stored in the mobile station.

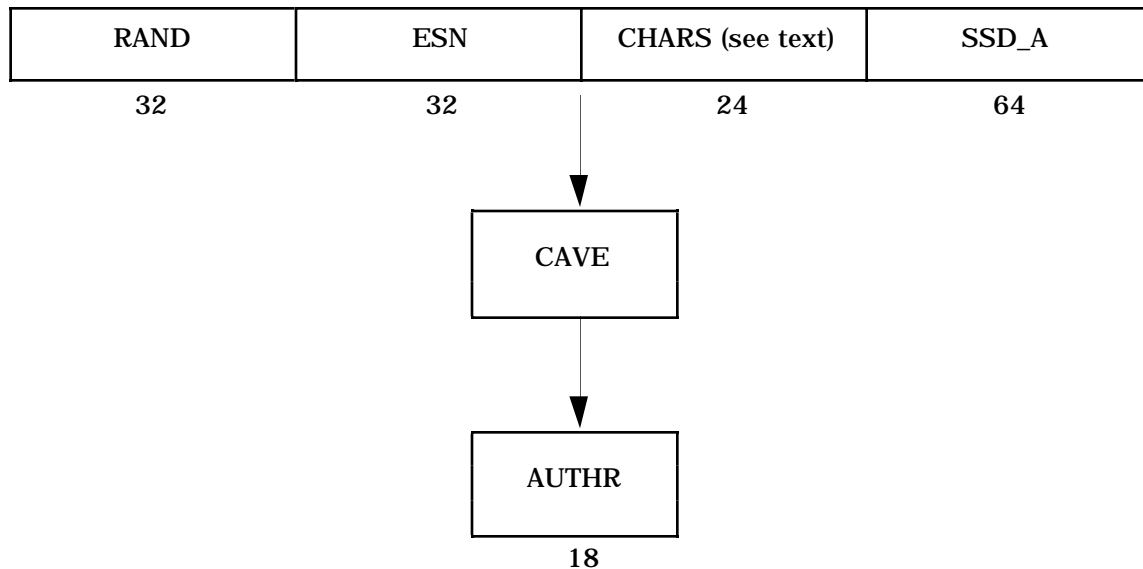
The base station computes the value of AUTHR using its internally stored value of SSD\_A. The base station compares its computed value of AUTHR to the value received from the mobile station.

The base station also compares the received value of RANDC to the most significant eight bits of its internally stored value of RAND.

The base station may also compare the received value of COUNT with its internally stored value associated with the received MIN/ESN.

If the comparisons are successful, the base station processes the message.

If any of the comparisons fail, the base station may ignore the message, initiate the Unique Challenge-Response Procedure (see 6.3.12.1.5) or commence the process of updating SSD (see 6.3.12.1.9).



**Figure 6.3.12.1.8-1. Computation of AUTHR for Authentication of Mobile Station Data Bursts**

#### 6.3.12.1.9 Updating the Shared Secret Data (SSD)

SSD is updated using CAVE (see 2.3.12.1.9), initialized with mobile station specific information, random data and the mobile station's A-key. The A-key is 64 bits long. It is assigned to the mobile station and is stored in the mobile station's permanent security and identification memory. The A-key is known only to the mobile station and to its associated Home Location Register/Authentication Center (HLR/AC) (see EIA/TIA/IS-41). See "Wideband Spread Spectrum Dual-Mode Cellular System Authentication and Privacy Procedures" for details of A-key entry into the mobile station.

1 The SSD update procedure is performed as follows:

2 The base station sends an *SSD Update Message* on either the Paging Channel or the  
3 Forward Traffic Channel. The RANDSSD field of the *SSD Update Message* contains the  
4 same value used for the HLR/AC computation of SSD. On the Paging Channel, the *SSD*  
5 *Update Message* contains the MIN and ESN of the mobile station being addressed. On the  
6 Forward Traffic Channel, the *SSD Update Message* does not contain the MIN and ESN; the  
7 MIN and ESN used by both the base station and the mobile station for initializing CAVE  
8 shall be the MIN and ESN used to establish the call.

9 Upon receipt of the *SSD Update Message* the mobile station shall initialize CAVE as shown  
10 in Figure 6.3.12.1.9-1. The mobile station shall then execute the CAVE algorithm (see  
11 2.3.12.1.9). The 64 most significant bits of the CAVE algorithm output are designated  
12 SSD\_A\_NEW and the 64 least significant bits of the output are designated SSD\_B\_NEW.

13 The mobile station shall then select a 32-bit random number RANDBS and shall send it to  
14 the base station in a *Base Station Challenge Order* on the Access Channel or Reverse Traffic  
15 Channel.

16 Both the mobile station and the base station shall then initialize CAVE as shown in Figure  
17 6.3.12.1.9-2 and shall execute the CAVE algorithm. For transactions on the Paging  
18 Channel and Access Channel, the value of MIN1 to be used shall be the same as the value  
19 specified in the *SSD Update Message* sent by the base station. For Traffic Channel  
20 transactions, the value of MIN1 to be used shall be the MIN1 used to establish the call. The  
21 18-bit result is designated AUTHBS. The base station sends its computed value of AUTHBS  
22 to the mobile station in a *Base Station Challenge Confirmation Order* on the Paging Channel  
23 or the Forward Traffic Channel.

24 Upon receipt of the *Base Station Challenge Confirmation Order* the mobile station shall  
25 compare the received value of AUTHBS to its internally computed value. (If the mobile  
26 station receives a *Base Station Challenge Confirmation Order* without having previously  
27 received an *SSD Update Message*, the mobile station shall respond with an *SSD Update*  
28 *Rejection Order*.)

29 If the comparison is successful, the mobile station shall set SSD\_A equal to SSD\_A\_NEW  
30 and shall set SSD\_B equal to SSD\_B\_NEW. The mobile station shall then send an *SSD*  
31 *Update Confirmation Order* to the base station, indicating successful completion of the SSD  
32 update.

33 If the comparison is not successful, the mobile station shall discard SSD\_A\_NEW and  
34 SSD\_B\_NEW. The mobile station shall then send an *SSD Update Rejection Order* to the  
35 base station, indicating unsuccessful completion of the SSD update.

36 Upon receipt of the *SSD Update Confirmation Order*, the base station sets SSD\_A and  
37 SSD\_B to the values received from the HLR/AC (see EIA/TIA/IS-41).

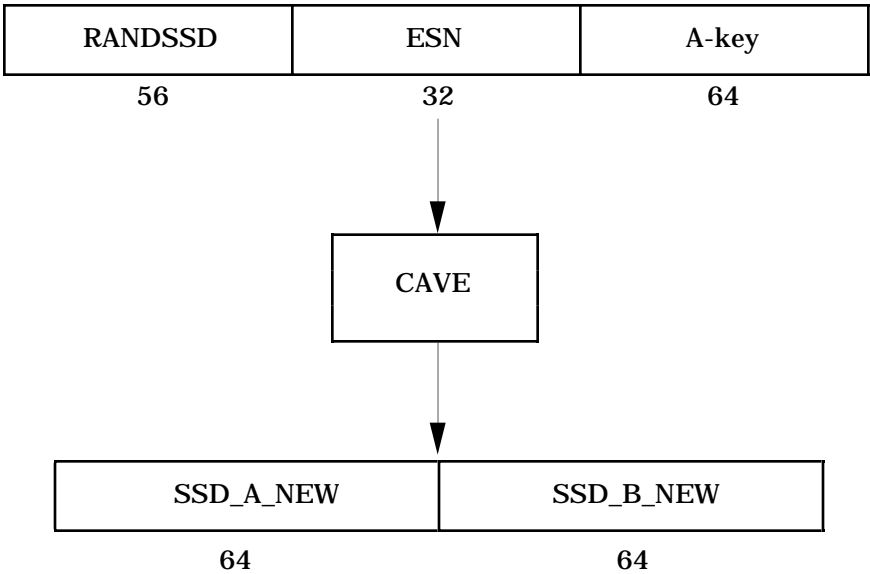


Figure 6.3.12.1.9-1. Computation of Shared Secret Data (SSD)

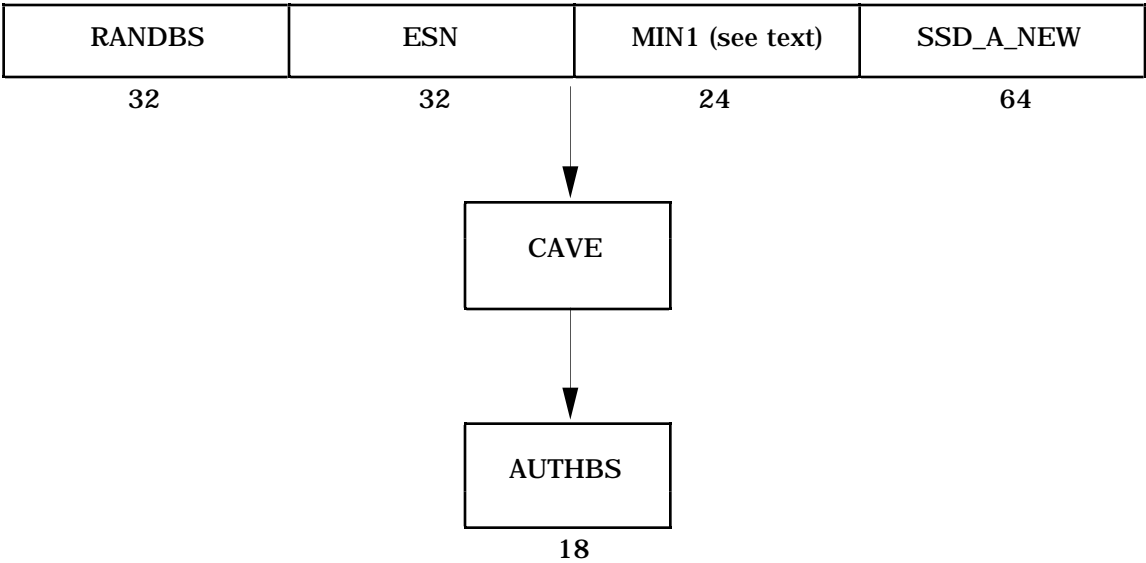


Figure 6.3.12.1.9-2. Computation of AUTHBS

### 6.3.12.2 Signaling Message Encryption

In an effort to enhance the authentication process and to protect sensitive subscriber information (such as PINs), a method is provided to encrypt certain fields of selected Traffic Channel signaling messages.

The standard message encryption algorithm is identical to the CMEA algorithm specified in Appendix A of EIA/TIA/IS-54-B.

The availability of encryption algorithm information is governed under the U. S. International Traffic and Arms Regulation (ITAR) and the Export Administration Regulations. TIA acts as the focal point and facilitator for making such information available. See EIA/TIA/IS-54-B for further details.

Messages shall not be encrypted if authentication is not performed (AUTH field equal to '00' in the *Access Parameters Message*).

Signaling message encryption is controlled for each call individually. The initial encryption mode for the call is established by the value of the ENCRYPT\_MODE field in the *Channel Assignment Message*. If ENCRYPT\_MODE is set to '0000', message encryption is off. To turn encryption on after channel assignment, the base station sends one of the following messages to the mobile station:

- *Handoff Direction Message* with the ENCRYPT\_MODE field set to '0001'
- *Analog Handoff Direction Message* with the MEM field set to '1'
- *Message Encryption Mode Order* with the ENCRYPT\_MODE field set to '0001'

Regardless of the time at which encryption is turned on, the data used to initialize the algorithm shall be computed using CAVE parameter values in effect at the end of the computation of AUTHR for the *Origination Message* or *Page Response Message* (see 6.3.12.1.6 and 6.3.12.1.7, respectively).

Encryption shall apply only to the part of the message body following the ENCRYPTED field, including any RESERVED field at the end of the message. The message CRC shall never be encrypted.

A message containing only one octet following the ENCRYPTED field cannot be encrypted.

When encryption is off, all fields of all signaling messages sent by the mobile station and base station are unencrypted.

When encryption is on (ENCRYPT\_MODE equal to binary '0001'), the encryptable fields of the following Forward Traffic Channel messages are encrypted. All other Forward Traffic Channel messages are unencrypted.

- *Alert With Information Message*
- *Flash With Information Message*
- *Data Burst Message*
- *Send Burst DTMF Message*
- *Continuous DTMF Tone Order*



- *Retrieve Parameters Message*
- *Set Parameters Message*

When encryption is on (ENCRYPT\_MODE equal to binary '0001') the encryptable fields of the following Reverse Traffic Channel messages shall always be encrypted. All other Reverse Traffic Channel messages shall be unencrypted.

- *Origination Continuation Message*
- *Flash With Information Message*
- *Data Burst Message*
- *Send Burst DTMF Message*
- *Continuous DTMF Tone Order*
- *Parameters Response Message*

To turn signaling message encryption off, the base station sends one of the following Forward Traffic Channel messages to the mobile station

- *Handoff Direction Message* with the ENCRYPT\_MODE field set to '0000'.
- *Analog Handoff Direction Message* with the MEM field set to '0'.
- *Message Encryption Mode Order* with the ENCRYPT\_MODE field set to '0000'.

### 6.3.12.3 Voice Privacy

Voice privacy is provided in the CDMA system by means of the private long code mask used for PN spreading (see 6.1.3.1.8).

The generation and application of the private long code mask is specified in "Wideband Spread Spectrum Dual-Mode Cellular System Authentication and Privacy Procedures."

Voice privacy control is provided on the Traffic Channels only. All calls are initiated using the public long code mask for PN spreading (see 6.1.3.1.8).

The transition to private long code mask shall not be performed if authentication is not performed (AUTH field set to '00' in the *Access Parameters Message* or mobile station unable to perform authentication).

To initiate a transition to the private or public long code mask, either the base station or the mobile station sends a *Long Code Transition Request Order* on the Traffic Channel. The mobile station actions in response to receipt of this order are specified in 6.6.4, and the base station actions in response to receipt of this order are specified in 7.6.4.

The base station can also cause a transition to the public long code mask by sending the *Handoff Direction Message* with the PRIVATE\_LCN bit set appropriately.

### 6.3.13 Lock Orders

The mobile station shall have memory to store the lock reason codes (LCKRSN<sub>S-p</sub> and LCKRSN<sub>P-s-p</sub>) received in the *Lock Order* and *Lock Until Power-Cycled Order*. The data retention time under power-off conditions shall be at least 48 hours.

#### 6.3.14 Mobile Station Revision Identification

The mobile station shall provide memory to store the following parameters sent in the *Status Message* (*Terminal Information* information record):

- CAI revision number (MOB\_CAI\_REV<sub>p</sub>)
- Manufacturer's model number (MOB\_MODEL<sub>p</sub>)
- Firmware revision number (MOB\_FIRM\_REV<sub>p</sub>)

### 6.4 Supervision

This section details the supervision mechanisms in CDMA. The time and numerical constant values (e.g. T<sub>30m</sub> and N<sub>2m</sub>) are given in Appendix D.

#### 6.4.1 Pilot Channel

The mobile station shall monitor the Pilot Channel at all times. The mobile station shall measure the strength of the Pilot Channel as specified in 6.6.6.2.2.

#### 6.4.2 Sync Channel

The mobile station shall check the CRC of all received Sync Channel messages (see 7.7.1.2.2). The mobile station shall ignore any message that has a CRC that does not check.

#### 6.4.3 Paging Channel

The mobile station shall check the CRC of all received Paging Channel messages (see 7.7.2.2.2). The mobile station shall ignore the body of a message that has a CRC that does not check.

If the mobile station is operating in the non-slotted mode in the *Mobile Station Idle State*, it shall monitor the Paging Channel at all times. The mobile station shall reset a timer for T<sub>30m</sub> seconds whenever a valid message is received on the Paging Channel, whether addressed to the mobile station or not. If the timer expires, the mobile station shall declare a loss of the Paging Channel.

If the mobile station is operating in the slotted mode in the *Mobile Station Idle State*, it shall set a timer for T<sub>30m</sub> seconds at the start of the first slot in which the Paging Channel is monitored, and shall reset the timer for T<sub>30m</sub> seconds whenever a valid message is received, whether addressed to the mobile station or not. If the timer expires while the mobile station is monitoring the Paging Channel, the mobile station shall declare a loss of the Paging Channel. The mobile station shall disable the timer when not monitoring the Paging Channel.

When in the *System Access State*, the mobile station shall monitor the Paging Channel at all times. The mobile station shall reset a timer for T<sub>40m</sub> seconds whenever a valid message is received on the Paging Channel, whether addressed to the mobile station or not. If the timer expires, the mobile station shall declare a loss of the Paging Channel.

#### 6.4.4 Forward Traffic Channel

The mobile station shall check the CRC of all received Forward Traffic messages (see 7.7.3.2.2). The mobile station shall ignore any message that has a CRC that does not check.

When in the *Mobile Station Control on the Traffic Channel State*, the mobile station shall monitor the Forward Traffic Channel at all times. If the mobile station receives  $N_{2m}$  consecutive bad frames on the Forward Traffic Channel (see 6.2.2.2), it shall disable its transmitter. Thereafter, if the mobile station receives  $N_{3m}$  consecutive good frames, the mobile station should re-enable its transmitter.

The mobile station shall establish a Forward Traffic Channel fade timer. The timer shall be enabled when the mobile station first enables its transmitter when in the *Traffic Channel Initialization Substate* of the *Mobile Station Control on the Traffic Channel State*. The fade timer shall be reset for  $T_{5m}$  seconds whenever  $N_{3m}$  consecutive good frames are received on the Forward Traffic Channel. If the timer expires, the mobile station shall disable its transmitter and declare a loss of the Forward Traffic Channel. The mobile station also resets this timer when it re-enables its transmitter when performing a CDMA to CDMA hard handoff (see 6.6.6.2.8).

#### 6.4.5 Accumulated Statistics

##### 6.4.5.1 Accumulated Access Channel Statistics

The mobile station shall maintain the counters shown in Table 6.4.5.1-1. Each counter shall be 16 bits long. The mobile station shall initialize each counter described herein to zero upon power-on; the mobile station shall not re-initialize any counter described herein at any other time.

The mobile station shall increment the ACC\_1 counter for each Access Channel request message it generates. The mobile station shall increment the ACC\_2 counter for each Access Channel response messages it generates. The mobile station shall increment the ACC\_i counter during the i-1 transmission of an access probe in the access attempt, for i equal 3 to 7. The mobile station shall increment ACC\_10 if the access attempt is unsuccessful due to the transmission of MAX\_REQ\_SEQ or MAX\_RSP\_SEQ probe sequences.

**Table 6.4.5.1-1. Accumulated Access Channel Statistics**

<b>Counter Identifier</b>	<b>Length (bits)</b>	<b>Description</b>
ACC_1	16	Number of Access Channel request messages generated by layer 3
ACC_2	16	Number of Access Channel response messages generated by layer 3
ACC_3	16	Number of times that an access probe was transmitted at least twice
ACC_4	16	Number of times that an access probe was transmitted at least three times
ACC_5	16	Number of times that an access probe was transmitted at least four times
ACC_6	16	Number of times that an access probe was transmitted at least five times
ACC_7	16	Number of times that an access probe was transmitted at least six times
ACC_8	-	Reserved
ACC_9	-	Reserved
ACC_10	16	Number of unsuccessful access attempts

#### 6.4.5.2 Accumulated Reverse Traffic Channel Statistics

The mobile station shall maintain the counters shown in Table 6.4.5.2-1 when supporting Multiplex Option 1. Each counter shall be 32 bits long. The mobile station shall initialize each counter described herein to zero upon power-on; the mobile station shall not re-initialize any counter described herein at any other time.

Each time a Multiplex Option 1 Reverse Traffic Channel frame is transmitted, the mobile station shall increment the counter corresponding to the type of frame.

**Table 6.4.5.2-1. Accumulated Reverse Traffic Channel Statistics**

<b>Counter Identifier</b>	<b>Length (bits)</b>	<b>Type of Frame</b>
MUX1_REV_1	32	9600 bps frame, primary traffic only
MUX1_REV_2	32	9600 bps frame, dim-and-burst with Rate 1/2 primary and signaling traffic
MUX1_REV_3	32	9600 bps frame, dim-and-burst with Rate 1/4 primary and signaling traffic
MUX1_REV_4	32	9600 bps frame, dim-and-burst with Rate 1/8 primary and signaling traffic
MUX1_REV_5	32	9600 bps frame, blank-and-burst with signaling traffic only
MUX1_REV_6	32	4800 bps frame, primary traffic only
MUX1_REV_7	32	2400 bps frame, primary traffic only
MUX1_REV_8	32	1200 bps frame, primary traffic or null Traffic Channel data only
MUX1_REV_9	-	Reserved
MUX1_REV_10	-	Reserved
MUX1_REV_11	32	9600 bps frame, dim-and-burst with Rate 1/2 primary and secondary traffic
MUX1_REV_12	32	9600 bps frame, dim-and-burst with Rate 1/4 primary and secondary traffic
MUX1_REV_13	32	9600 bps frame, dim-and-burst with Rate 1/8 primary and secondary traffic
MUX1_REV_14	32	9600 bps frame, blank-and-burst with secondary traffic only

### 6.4.5.3 Accumulated Paging Channel Statistics

The mobile station shall maintain the counters shown in Table 6.4.5.3-1. The counters shall have the length specified in the Table 6.4.5.3-1. The mobile station shall initialize each counter described herein to zero upon power-on; the mobile station shall not re-initialize any counter described herein at any other time.

The mobile station shall increment the counter PAG\_1 for each Paging Channel message CRC that it tests. The mobile station shall increment the counter PAG\_2 for each valid Paging Channel message. The mobile station shall increment the counter PAG\_3 for each record or message that it receives addressed to the mobile station's ESN or to an active MIN

at the mobile station. The PAG\_3 counter shall not be incremented for messages detected as duplicates or for acknowledgements.<sup>13</sup> The mobile station shall increment the counter PAG\_4 each time that it has determined that synchronization was lost on the Paging Channel during the time that the mobile station is active.<sup>14</sup> PAG\_4 shall not count the initial synchronization performed by a slotted mobile station for each of its assigned timeslots. The mobile station shall increment the counter PAG\_5 each time that it declares a loss of the Paging Channel (see 6.4.3). The mobile station shall increment the counter PAG\_6 for each idle handoff it performs.

**Table 6.4.5.3-1. Accumulated Paging Channel Statistics**

Counter Identifier	Length (bits)	Description
PAG_1	32	Number of Paging Channel messages the mobile station attempted to receive
PAG_2	32	Number of Paging Channel messages the mobile station received with a good CRC
PAG_3	16	Number of Paging Channel messages or records the mobile station received that were addressed to it
PAG_4	16	Number of times that the mobile station had to resynchronize to the Paging Channel
PAG_5	16	Number of times that the mobile station declared a loss of the Paging Channel
PAG_6	16	Number of mobile station idle handoffs

#### 6.4.5.4 Accumulated Forward Traffic Channel Statistics

The mobile station shall maintain the counters shown in Table 6.4.5.4-1 when supporting Multiplex Option 1. Each counter shall be 32 bits long. The mobile station shall initialize each counter described herein to zero upon power-on; the mobile station shall not re-initialize any counter described herein at any other time.

Each time a mobile station categorizes a received Multiplex Option 1 Forward Traffic Channel frame (see 6.2.2.2), the mobile station shall increment the counter corresponding to the type of frame. The accumulation shall start when the mobile station enables its

<sup>13</sup>PAG\_3 counts those messages processed by layer 3.

<sup>14</sup>A typical mobile station implementation can assume that the mobile station is synchronized with the Paging Channel message stream until several successive messages do not have good CRCs. At this point, the mobile station can search for an SOM bit that is a '1'. PAG\_4 counts these events.

transmitter while in the *Traffic Channel Initialization Substate* of the *Mobile Station Control on the Traffic Channel State* (see 6.6.4.2). The accumulation shall stop when the mobile station exits the *Mobile Station Control on the Traffic Channel State*.

**Table 6.4.5.4-1. Accumulated Forward Traffic Channel Statistics**

Counter Identifier	Length (bits)	Type of Frame
MUX1_FOR_1	32	9600 bps frame, primary traffic only
MUX1_FOR_2	32	9600 bps frame, dim-and-burst with Rate 1/2 primary and signaling traffic
MUX1_FOR_3	32	9600 bps frame, dim-and-burst with Rate 1/4 primary and signaling traffic
MUX1_FOR_4	32	9600 bps frame, dim-and-burst with Rate 1/8 primary and signaling traffic
MUX1_FOR_5	32	9600 bps frame, blank-and-burst with signaling traffic only
MUX1_FOR_6	32	4800 bps frame, primary traffic only
MUX1_FOR_7	32	2400 bps frame, primary traffic only
MUX1_FOR_8	32	1200 bps frame, primary traffic or null Traffic Channel data only
MUX1_FOR_9	32	9600 bps frame, primary traffic only, probable bit errors
MUX1_FOR_10	32	Frame quality insufficient to decide upon rate
MUX1_FOR_11	32	9600 bps frame, dim-and-burst with Rate 1/2 primary and secondary traffic
MUX1_FOR_12	32	9600 bps frame, dim-and-burst with Rate 1/4 primary and secondary traffic
MUX1_FOR_13	32	9600 bps frame, dim-and-burst with Rate 1/8 primary and secondary traffic
MUX1_FOR_14	32	9600 bps frame, blank-and-burst with secondary traffic only

#### 6.4.5.5 Accumulated Layer Two Statistics

The mobile station shall maintain the counters shown in Table 6.4.5.5-1. Each counter shall be 16 bits long. The mobile station shall initialize each counter described herein to zero upon power-on; the mobile station shall not re-initialize any counter described herein at any other time.

When the mobile station transmits a Reverse Traffic Channel message requiring an acknowledgement for the  $i$ th time, for  $i$  equal 1 to 3, it shall increment the counter LAYER2\_RTC $i$ .

The mobile station shall increment the counter LAYER2\_RTC5 each time it aborts using the Traffic Channel because the timeout expired after the  $N_{1m}$  transmission of a message requiring an acknowledgement.

The mobile station shall increment the counter LAYER2\_RTC6 for each transmission of a message not requiring an acknowledgement on the Reverse Traffic Channel. This count shall include all transmissions, including those that were repeated multiple times or those carrying an identical layer 3 content.

**Table 6.4.5.5-1. Accumulated Layer 2 Statistics**

Counter Identifier	Length (bits)	Description
LAYER2_RTC1	16	Number of messages requiring acknowledgement that were transmitted at least once on the Reverse Traffic Channel
LAYER2_RTC2	16	Number of messages requiring acknowledgement that were transmitted at least twice on the Reverse Traffic Channel
LAYER2_RTC3	16	Number of messages requiring acknowledgement that were transmitted at least three times on the Reverse Traffic Channel
LAYER2_RTC4	16	Reserved
LAYER2_RTC5	16	Number of times that the mobile station aborted a call as a result of the timeout expiring after the $N_{1m}$ transmission of a message requiring acknowledgement
LAYER2_RTC6	16	Number of times a message not requiring an acknowledgement was sent on the Reverse Traffic Channel



#### 6.4.5.6 Other Monitored Quantities and Statistics

The mobile station shall store the value described in Table 6.4.5.6-1.

**Table 6.4.5.6-1. Other Monitored Quantities and Statistics**

Quantity Identifier	Length (bits)	Description
OTHER_SYS_TIME	36	The SYS_TIME field from the first <i>Sync Channel</i> Message received after power-on

### 6.5 Malfunction Detection

The mobile station shall include methods to detect malfunctions that would cause degradation to system capacity. Once a failure has been detected, transmission from the mobile station shall remain disabled until the failed test is successfully performed on two consecutive test attempts.

#### 6.5.1 Malfunction Timer

The mobile station shall have a malfunction timer which meets the requirements of 2.5.1.

#### 6.5.2 Transmit Waveform Quality

To ensure that the majority of mobile stations transmit spread spectrum signals which do not adversely affect system capacity, the transmit waveform of each mobile station shall exceed a specified waveform quality with a specified probability, called the availability. This transmit waveform quality,  $\rho$ , is defined as

$$\rho = \max_{\theta, \tau} \frac{\left| \int_0^T x(t; \theta) y(t + \tau; \theta) dt \right|^2}{\int_0^T x^2(t; \theta) dt \int_0^T y^2(t; \theta) dt}$$

where  $x(t; \theta)$  is the transmit waveform with phase  $\theta$ ,  $y(t; \theta)$  is the waveform defined in 6.1 with phase  $\theta$ , and  $T$  is the integration interval.<sup>15</sup> During the entire service life of the mobile station, the transmit waveform quality shall exceed the waveform quality value given in

<sup>15</sup>Transmit waveform quality can be viewed as the output of a normalized ideal matched filter. The range of values for the transmit waveform quality is from 1.0 for a perfect CDMA waveform to 0.0 for a non-CDMA signal. As an example, a mobile station with a 0.5 dB degradation in its transmit waveform would have a quality,  $\rho$ , of  $10^{(-0.5/10)} = 0.89$ .

Table 6.5.2-1 with the given availability value or the transmitter shall be disabled.<sup>16</sup> Refer to “Recommended Minimum Performance Standards for 800 MHz Wideband Spread Spectrum Dual-Mode Mobile Stations.”

**Table 6.5.2-1. Required Availability of Transmit Waveform Quality**

<b>Transmit Waveform Quality, <math>\rho</math></b>	<b>Transmit Waveform Degradation</b>	<b>Availability</b>
$\geq 0.89$	$\leq 0.5$ dB	$\geq 98\%$
$\geq 0.45$	$\leq 3.5$ dB	$\geq 99.9\%$
$\geq 0.1$	$\leq 10.0$ dB	$\geq 99.999\%$

---

<sup>16</sup>Manufacturers can achieve these availability numbers through a combination of self-tests, reliability analysis, and reliability tests.

The requirement can also be stated as follows: A manufacturer's mobile station cannot transmit and exceed the minimum performance requirements by more than the specified transmit waveform degradation with greater than the specified probability at any point in its service life. No more than two percent of a manufacturer's mobile stations can have up to a 0.5 dB degradation; no more than 0.1% can have up to a 3.5 dB degradation; and no more than 0.001% can have up to a 10.0 dB degradation.

## 6.6 Call Processing

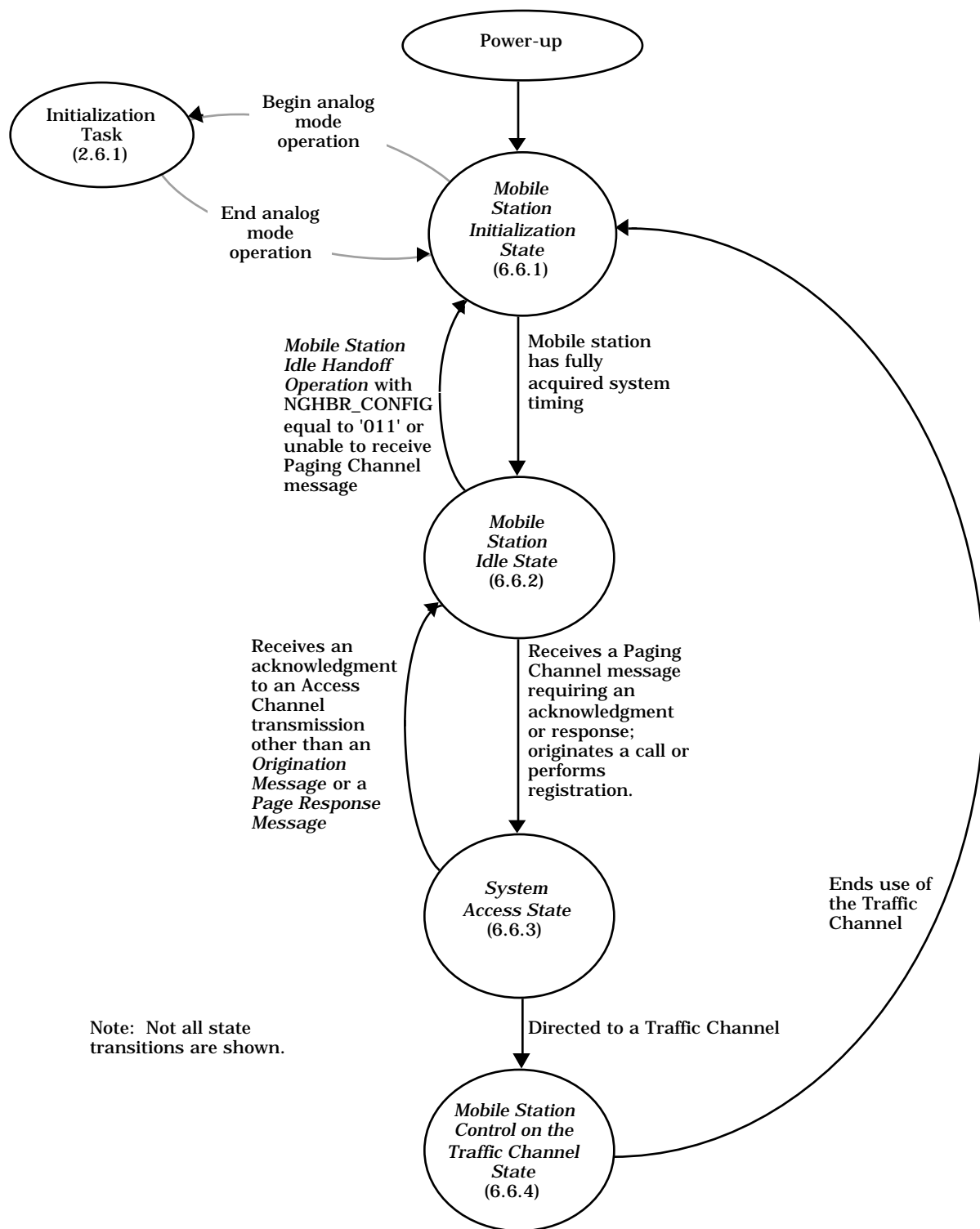
This section describes mobile station call processing. It contains frequent references to the messages that flow between the mobile station and base station. While reading this section, it may be helpful to refer to the message formats (see 6.7 and 7.7), and to the message flow examples (see Appendix B).

The values for the time and numerical constants used in this section (e.g.,  $T_{20m}$ ,  $N_{4m}$ ) are specified in Appendix D.

As illustrated in Figure 6.6-1, mobile station call processing consists of the following states:

- *Mobile Station Initialization State* - In this state, the mobile station selects and acquires a system.
- *Mobile Station Idle State* - In this state, the mobile station monitors messages on the Paging Channel.
- *System Access State* - In this state, the mobile station sends messages to the base station on the Access Channel.
- *Mobile Station Control on the Traffic Channel State* - In this state, the mobile station communicates with the base station using the Forward and Reverse Traffic Channels.

After power is applied to the mobile station, it shall enter the *System Determination Substate* of the *Mobile Station Initialization State* with a power-up indication.



2

3

**Figure 6.6-1. Mobile Station Call Processing States**

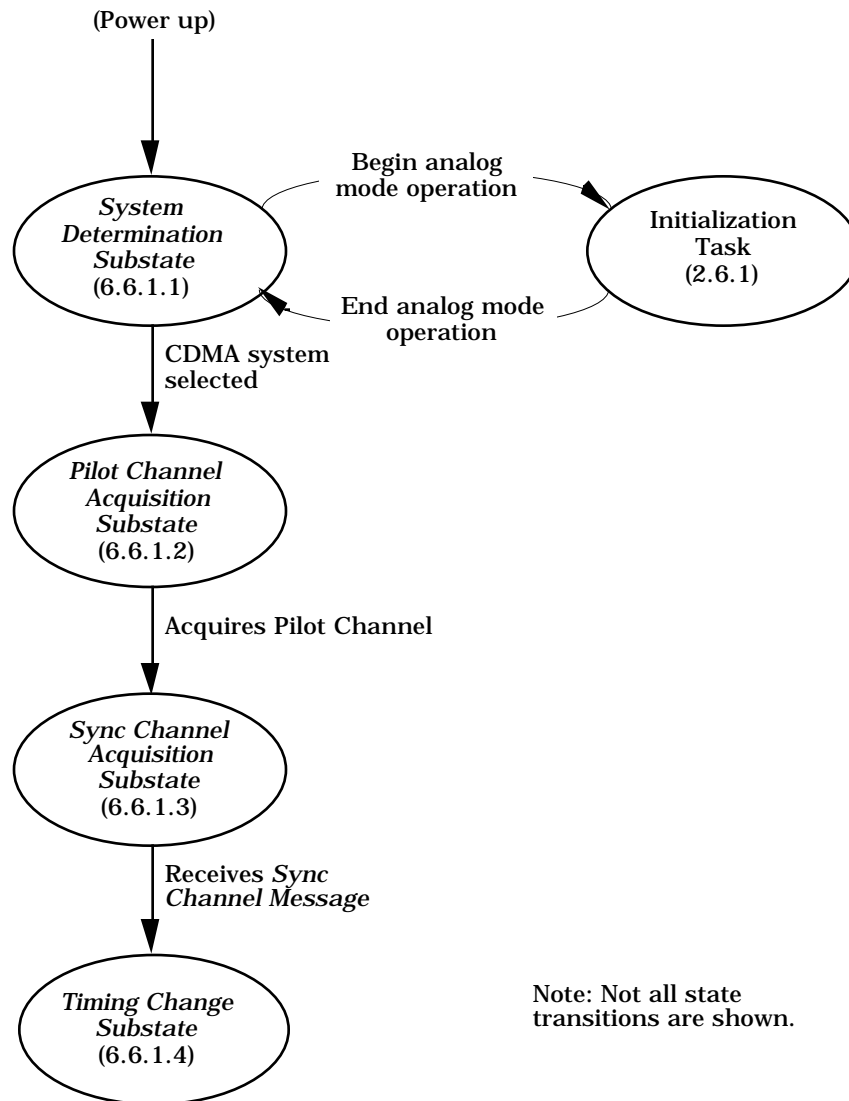
### 6.6.1 Mobile Station Initialization State

In this state, the mobile station first selects a system to use. If the selected system is a CDMA system, the mobile station proceeds to acquire and then synchronize to the CDMA system. If the selected system is an analog system, the mobile station begins analog mode operation.

As illustrated in Figure 6.6.1-1, the *Mobile Station Initialization State* consists of the following substates:

- *System Determination Substate* - In this substate, the mobile station selects which system to use.
- *Pilot Channel Acquisition Substate* - In this substate, the mobile station acquires the Pilot Channel of a CDMA system.
- *Sync Channel Acquisition Substate* - In this substate, the mobile station obtains system configuration and timing information for a CDMA system.
- *Timing Change Substate* - In this substate, the mobile station synchronizes its timing to that of a CDMA system.

While in the *Mobile Station Initialization State*, the mobile station shall update all active registration timers as specified in 6.6.5.6.1.2.



Note: Not all state transitions are shown.

**Figure 6.6.1-1. Mobile Station Initialization State**

#### 6.6.1.1 System Determination Substate

In this substate, the mobile station selects the system to use. The precise process for system selection is left to the mobile station manufacturer. It is typically influenced by a set of expressed user preferences, such as the following:

- System A (or B) only
- System A (or B) preferred
- CDMA (or analog) system only
- CDMA (or analog) system preferred
- CDMA Primary (or Secondary) Channel preferred

Upon entering the *System Determination Substate*, the mobile station shall initialize registration parameters as specified in 6.6.5.6.1.1. If the mobile station enters the *System Determination Substate* with a power-up indication, the mobile station shall set the First-Idle ID status to enabled (see 2.6.3.11), and the RAND<sub>S</sub> variable to 0 (see 2.3.12.1.2).

In the *System Determination Substate*, the mobile station shall perform the following:

- The mobile station shall determine which system to use.
- If the mobile station is to use System A, it shall set SERVSYS<sub>S</sub> to SYS\_A. If the mobile station is to use System B, it shall set SERVSYS<sub>S</sub> to SYS\_B.
- If the mobile station is to use an analog system, it shall enter the Initialization Task (see 2.6.1).
- If the mobile station is to use a CDMA system, it shall set CDMACH<sub>S</sub> either to the Primary or Secondary CDMA Channel number for the selected serving system (SERVSYS<sub>S</sub>). The mobile station shall enter the *Pilot Channel Acquisition Substate*.

If the mobile station fails to acquire a CDMA system on the first CDMA Channel it tries, the mobile station should attempt to acquire on the alternate CDMA Channel (Primary or Secondary) before performing the system selection process again.

#### 6.6.1.2 Pilot Channel Acquisition Substate

In this substate, the mobile station acquires the Pilot Channel of the selected CDMA system.

Upon entering the *Pilot Channel Acquisition Substate*, the mobile station shall tune to the CDMA Channel number equal to CDMACH<sub>S</sub> and set its code channel for the Pilot Channel.

The mobile station shall search for the Pilot Channel. If the mobile station acquires the Pilot Channel within T<sub>20m</sub> seconds, the mobile station shall enter the *Sync Channel Acquisition Substate*.

If the mobile station does not acquire the Pilot Channel within T<sub>20m</sub> seconds, the mobile station shall enter the *System Determination Substate*.

### 6.6.1.3 Sync Channel Acquisition Substate

In this substate, the mobile station receives and processes the *Sync Channel Message* to obtain system configuration and timing information.

Upon entering the *Sync Channel Acquisition Substate*, the mobile station shall set its code channel for the Sync Channel.

If the mobile station does not receive a valid *Sync Channel Message* (see 6.4.2) within  $T_{21m}$  seconds, the mobile station shall enter the *System Determination Substate*.

If the mobile station receives a valid *Sync Channel Message* within  $T_{21m}$  seconds but the CAI revision level supported by mobile station ( $MOB\_CAI\_REV_p$ ) is less than the minimum CAI revision level supported by the base station ( $MIN\_CAI\_REV_r$ ), the mobile station shall enter the *System Determination Substate*.

If the mobile station receives a valid *Sync Channel Message* within  $T_{21m}$  seconds and the CAI revision level supported by the mobile station ( $MOB\_CAI\_REV_p$ ) is greater than or equal to the minimum CAI revision level supported by the base station ( $MIN\_CAI\_REV_r$ ), the mobile station shall store the following information from the message:

- Common Air Interface revision level ( $CAI\_REV_s = CAI\_REV_r$ )
- Minimum Common Air Interface revision level ( $MIN\_CAI\_REV_s = MIN\_CAI\_REV_r$ )
- System identification ( $SID_s = SID_r$ )
- Network identification ( $NID_s = NID_r$ )
- Pilot PN sequence offset ( $PILOT\_PN_s = PILOT\_PN_r$ )
- Long code state ( $LC\_STATE_s = LC\_STATE_r$ )
- Paging Channel data rate ( $PRAT_s = PRAT_r$ )
- System Time ( $SYS\_TIME_s = SYS\_TIME_r$ )

The mobile station may store the following information from the message:

- Number of leap seconds that have occurred since the start of System Time ( $LP\_SEC_s = LP\_SEC_r$ )
- Offset of local time from System Time ( $LTM\_OFF_s = LTM\_OFF_r$ )
- Daylight savings time indicator ( $DAYLT_s = DAYLT_r$ )

The mobile station shall enter the *Timing Change Substate*.

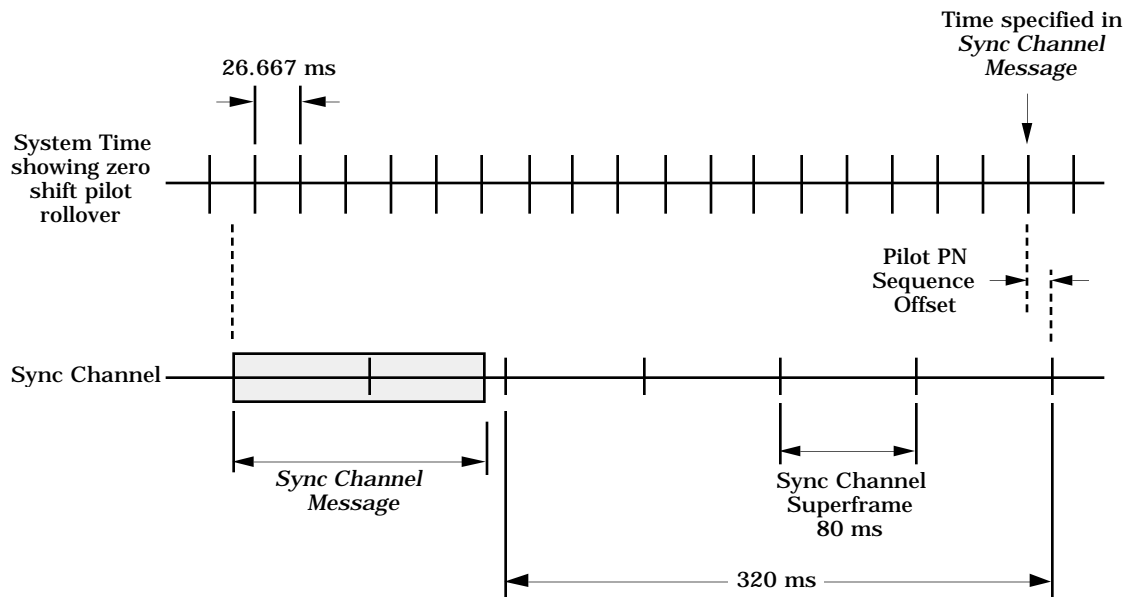
### 6.6.1.4 Timing Change Substate

In this substate, the mobile station synchronizes its long code timing and system timing to those of the CDMA system, using the  $LC\_STATE_s$  and  $SYS\_TIME_s$  values obtained from the received *Sync Channel Message*.  $SYS\_TIME_s$  is equal to the System Time corresponding to 320 ms past the end of the last 80 ms superframe (see Figure 7.7.1.1-1) of the received *Sync Channel Message* minus the pilot PN offset.  $LC\_STATE_s$  is equal to the system long code state corresponding to  $SYS\_TIME_s$  (see Figure 6.6.1.4-1).



In the *Timing Change Substate*, the mobile station shall synchronize its long code timing to the CDMA system long code timing derived from  $LC\_STATE_S$ , and synchronize its system timing to the CDMA system timing derived from  $SYS\_TIME_S$ .

The mobile station shall set  $PAGECH_S$  to the Primary CDMA Paging Channel number and perform registration initialization as specified in 6.6.5.6.1.3. The mobile station shall enter the *Mobile Station Idle State*.



**Figure 6.6.1.4-1. Mobile Station Internal Timing**

## 6.6.2 Mobile Station Idle State

In this state, the mobile station monitors the Paging Channel. The mobile station can receive messages, receive an incoming call (mobile station terminated call), initiate a call (mobile station originated call), initiate a registration request, or initiate a message transmission.

Upon entering the *Mobile Station Idle State*, the mobile station shall set its code channel to  $PAGECH_S$ , set the Paging Channel data rate as determined by  $PRAT_S$  and shall perform Paging Channel supervision as specified in 6.4.3.

At any time, the mobile station may exit the *Mobile Station Idle State* and enter the *System Determination Substate* of the *Mobile Station Initialization State*.

While in the *Mobile Station Idle State*, the mobile station shall perform the following procedures:

- The mobile station shall perform Paging Channel monitoring procedures as specified in 6.6.2.1.1.

- The mobile station shall perform message acknowledgement procedures as specified in 6.6.2.1.2.
- The mobile station shall perform registration procedures as specified in 6.6.2.1.3.
- The mobile station shall perform idle handoff procedures as specified in 6.6.2.1.4.
- The mobile station shall perform the *Response to Overhead Information Operation* as specified in 6.6.2.2 whenever the mobile station receives a system overhead message (*System Parameter Message*, *CDMA Channel List Message*, *Neighbor List Message* or *Access Parameters Message*).
- The mobile station shall perform the *Mobile Station Page Match Operation* as specified in 6.6.2.3 whenever it receives a *Page Message* or *Slotted Page Message*.
- The mobile station shall perform the *Mobile Station Order and Message Processing Operation* as specified in 6.6.2.4 whenever the mobile station receives a message other than a system overhead message or a page message.
- The mobile station shall perform the *Mobile Station Origination Operation* as specified in 6.6.2.5 if directed by the user to initiate a call.
- If the mobile station supports message transmission, it shall perform the *Mobile Station Message Transmission Operation* as specified in 6.6.2.6 if directed by the user to transmit a message.
- The mobile station shall perform the *Mobile Station Power-Down Operation* as specified in 6.6.2.7 if directed by the user to power down.

#### 6.6.2.1 Idle Procedures

##### 6.6.2.1.1 Paging Channel Monitoring Procedures

###### 6.6.2.1.1.1 General Overview

The Paging Channel is divided into 200 ms time slots called Paging Channel slots. Paging and control messages for a mobile station operating in the non-slotted mode can be received in any of the Paging Channel slots. Therefore, the non-slotted mode of operation requires the mobile station to monitor all slots.

The Paging Channel protocol also provides for scheduling the transmission of messages for a specific mobile station in certain assigned time slots. Support of this feature is optional and may be enabled independently for each mobile station. A mobile station that monitors the Paging Channel only during its assigned timeslot is referred to as operating in the slotted mode. During the time slots in which the Paging Channel is not being monitored, the mobile station can stop or reduce its processing for power conservation. A mobile station may not operate in the slotted mode in any state except the *Mobile Station Idle State*.

A mobile station operating in the slotted mode generally monitors the Paging Channel for one or two slots per slot cycle. The mobile station can control the length of the slot cycle through the *SLOT\_CYCLE\_INDEX* field in the *Initial Registration Message* or *Registration Update Message*. The length of the slot cycle, *T*, in seconds, is given by

$$T = 2^{\text{SLOT\_CYCLE\_INDEX}}$$

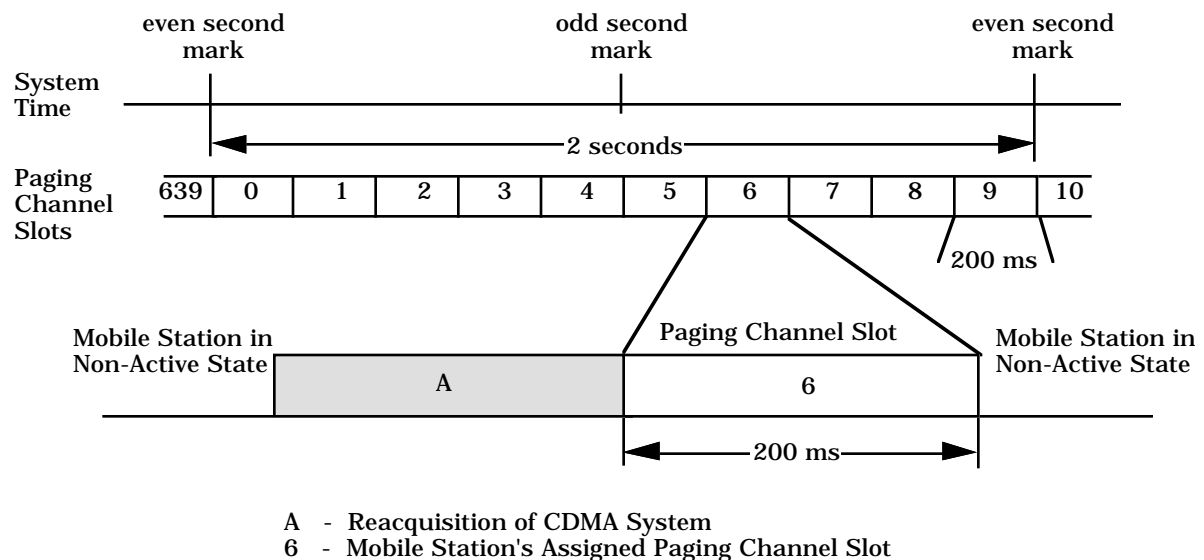
There are  $5 \times T$  slots in a slot cycle.

The SLOT\_NUM field of the *Slotted Page Message* is the Paging Channel slot number, modulo the maximum length slot cycle (640 slots). That is, the value of SLOT\_NUM is

$$\text{SLOT\_NUM} = \lfloor t/10 \rfloor \bmod 640,$$

where  $t$  is the System Time in frames. For each mobile station, the starting times of its slot cycles are offset from the slot in which SLOT\_NUM equals zero by a fixed, randomly selected number of slots as specified in 6.6.2.1.1.3. A mobile station operating in the slotted mode can use the SLOT\_NUM field to determine its slot cycle time alignment with the base station.

Figure 6.6.2.1.1.1-1 shows an example for a slot cycle length of two seconds, in which the computed value of PGSLOT (see 6.6.2.1.1.3) is equal to 6, so that one of the mobile station's slot cycles begins when SLOT\_NUM equals 6. The mobile station begins monitoring the Paging Channel at the start of the slot in which SLOT\_NUM equals 6. The next slot in which the mobile station must begin monitoring the Paging Channel is 10 slots later, i.e., the slot in which SLOT\_NUM is  $(6 + 5 \times T)$  modulo 640, which is 16.



**Figure 6.6.2.1.1.1-1. Mobile Station Idle Slotted Mode Structure Example (see text)**

*Slotted Page Messages* contain a field called MORE\_PAGES which, when set to '0' during a mobile station's assigned slot, indicates that the remainder of the slot will contain no more messages addressed to that mobile station. This allows a mobile station operating in the slotted mode to stop monitoring the Paging Channel as soon as possible.

If a *Slotted Page Message* containing the MORE\_PAGES field equal to '0' is not received in the assigned slot, the mobile station continues to monitor the Paging Channel for one

additional slot. This allows the base station to carry over a message begun in the assigned slot into the following slot if necessary.

#### 6.6.2.1.1.2 Non-Slotted Mode Requirements

A mobile station operating in the non-slotted mode shall monitor the Paging Channel at all times. If the mobile station declares loss of the Paging Channel (see 6.4.3), the mobile station shall enter the *System Determination Substate* of the *Mobile Station Initialization State*.

When a mobile station monitors the Paging Channel in any state other than the *Mobile Station Idle State*, it shall operate in the non-slotted mode.

#### 6.6.2.1.1.3 Slotted Mode Requirements

A mobile station operating in the slotted mode is not required to monitor the Paging Channel at all times.

If the mobile station declares loss of the Paging Channel (see 6.4.3), the mobile station shall enter the *System Determination Substate* of the *Mobile Station Initialization State*.

If the mobile station's slot cycle is modified, the mobile station performs parameter-change registration (see 6.6.5.1.6).

If the mobile station user configures a mobile station for slotted mode operation, the mobile station shall specify its preferred slot cycle index in the SLOT\_CYCLE\_INDEX field of the *Initial Registration Message* or a *Registration Update Message*. Operation with the modified slot cycle shall begin only after an acknowledgement of the registration has been received. A mobile station equipped for slotted operation may disable slotted operation by setting bit 5 of the station class mark to '0' (see 2.3.3).

If any of the following conditions is true, the mobile station shall operate either in the non-slotted mode or in the slotted mode with either a 1 or 2 second slot cycle (SLOT\_CYCLE\_INDEX equal to 0 or 1):

- The system configuration parameters are not current (see 6.6.2.2); or
- If the current base station's SID and NID (SID<sub>s</sub> and NID<sub>s</sub>, as stored from the *System Parameters Message*) do not match any entry of SID\_NID\_LIST<sub>s</sub>.

If the mobile station's stored system configuration parameters are current (see 6.6.2.2) and SID\_NID\_LIST<sub>s</sub> contains an entry corresponding to SID<sub>s</sub> and NID<sub>s</sub>, then the mobile station should use the value of SLOT\_CYCLE\_INDEX sent in the last registration message to determine its assigned slot. If the mobile station does not use this value, it shall operate either in the non-slotted mode or in the slotted mode with either a 1 or 2 second slot cycle (SLOT\_CYCLE\_INDEX equal to 0 or 1).

A mobile station operating in the slotted mode shall use the hash function specified in 6.6.7.1 to select a number PGSLOT in the range 0 to 639 (spanning the maximum slot cycle length, which is 128 seconds). The mobile station's assigned slots shall be those slots in which

$$(\lfloor t/10 \rfloor - \text{PGSLOT}) \bmod (5 \times T) = 0,$$

where  $t$  is the System Time in frames and  $T$  is the slot cycle length in seconds given by

$$T = 2^{\text{SLOT\_CYCLE\_INDEX}}$$

The mobile station shall begin monitoring the Paging Channel in time to receive the first bit of each assigned slot.

If a mobile station operating in the slotted mode determines that the configuration information is not current, as specified in 6.6.2.2, it shall continue to monitor the Paging Channel until either the configuration information has been updated and is current or the mobile station declares loss of the Paging Channel (see 6.4.3). When the configuration information is current, the mobile station shall continue to monitor the Paging Channel until one of the following conditions is true:

- A *Slotted Page Message* has been received during the assigned slot with the MORE\_PAGES bit equal to '0'; or
- The mobile station has monitored the Paging Channel for two time slots, starting with the assigned slot, and has received at least one valid message (see 6.4.3); or
- The mobile station declares loss of the Paging Channel (see 6.4.3).

#### 6.6.2.1.2 Acknowledgement Procedures

Acknowledgement procedures facilitate the reliable exchange of messages between the base station and the mobile station. The mobile station uses the fields ACK\_SEQ (acknowledgement sequence number), MSG\_SEQ (message sequence number), ACK\_REQ (acknowledgement required), and VALID\_ACK (valid acknowledgement) to support this mechanism. These fields are referred to as layer 2 fields, and the acknowledgement procedures are referred to as layer 2 procedures. All other message fields and the processing thereof are referred to as pertaining to layer 3. (See Appendix C for further discussion of layering.)

Acknowledgements of messages received on the Paging Channel shall be sent on the Access Channel (see 6.6.3).

When sending a message that includes an acknowledgement, the mobile station shall set the VALID\_ACK field to '1' and shall set the ACK\_SEQ field equal to the MSG\_SEQ field of the message being acknowledged. For acknowledgement of a *Page Message* or *Slotted Page Message*, the mobile station shall set the ACK\_SEQ field equal to the MSG\_SEQ field of the record containing the MIN that matched one of the mobile station's active MINs.

When sending a message that does not include an acknowledgement, the mobile station shall set the VALID\_ACK field to '0' and shall set the ACK\_SEQ field equal to the ACK\_SEQ field of the previous message sent. If no previous message has been sent, the mobile station shall set the ACK\_SEQ field to '00'.

Unless otherwise specified in the requirements for processing a specific message, the mobile station shall transmit an acknowledgement in response to any message received that is addressed to the mobile station and that has the ACK\_REQ field set to '1'. The mobile station shall transmit a *Page Response Message* including an acknowledgement in response to each record of a *Page Message* or *Slotted Page Message* addressed to one of the mobile

station's active MINs.<sup>17</sup> If a specific message is required in response to any other message requiring acknowledgement, the acknowledgement shall be included with the response. If no specific message is required to be transmitted in response to a received message requiring acknowledgement, the mobile station shall include the acknowledgement in a *Mobile Station Acknowledgement Order* (see 6.7.3).

If no message requiring acknowledgement has been received, the mobile station shall not include an acknowledgement in any transmitted message until a message is received that requires acknowledgement. After a message including an acknowledgement has been sent, the mobile station shall not include an acknowledgement in any subsequent transmitted message until another message is received that requires acknowledgement.

The mobile station shall detect duplicate received messages by the following rules.

The mobile station shall consider two messages (or order records) addressed to the mobile station's ESN (all directed messages except *Page Messages* and *Slotted Page Messages*) to be duplicates if all of the following are true:

- The messages (records) were received on the same Paging Channel; and
- The messages (records) contain the same values in both the MSG\_SEQ and ACK\_REQ fields;<sup>18</sup> and
- The messages (records) were received within  $T_{4m}$  seconds (see Appendix D) of each other (see Figure 6.6.2.1.2-1); and

The mobile station shall consider two page records (addressed by MIN, as contained in *Page Messages* and *Slotted Page Messages*) to be duplicates if all of the following are true:

- The records were received on the same Paging Channel; and
- The records contain the same values in the MSG\_SEQ field; and
- The records were received in messages received within  $T_{4m}$  seconds of each other (see Figure 6.6.2.1.2-1), or in the same message; and
- Both records are addressed to the same MIN.

The mobile station shall discard, without further processing, any message or page record that is a duplicate of one previously received.

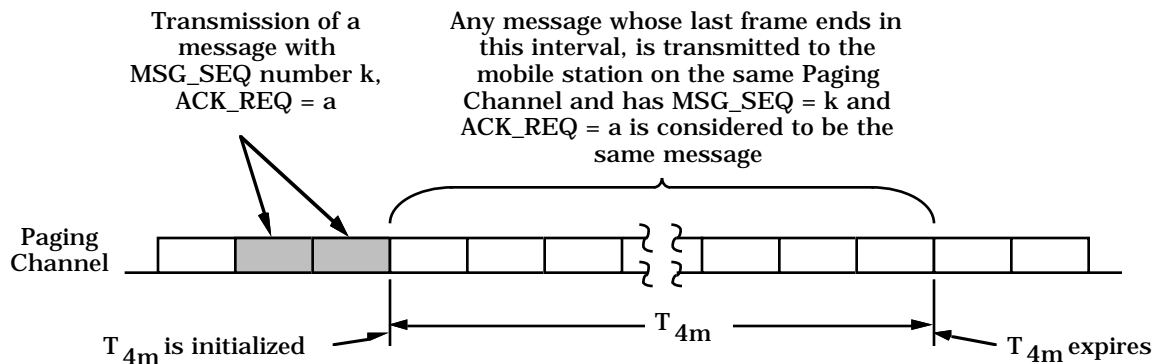
Paging Channels shall be considered different if they are transmitted by different base stations, if they are transmitted on different code channels or if they are transmitted on different CDMA Channels.

The mobile station shall consider messages to be different if they are not duplicates according to the rules given above. The mobile station shall process all messages that are considered to be different.

---

<sup>17</sup>These messages do not have an ACK\_REQ field.

<sup>18</sup>Separate sequence numbers are used for messages requiring acknowledgement and messages not requiring acknowledgement on the Paging Channel.



**Figure 6.6.2.1.2-1. Time Interval for Duplicate Message Detection**

### 6.6.2.1.3 Registration

While in the *Mobile Station Idle State*, the mobile station shall maintain all active registration timers (see 6.6.5.5), and shall perform the registration procedures specified in 6.6.5.6.2.1.

### 6.6.2.1.4 Idle Handoff

#### 6.6.2.1.4.1 Pilot Search

An idle handoff occurs when a mobile station has moved from the area of coverage of one base station into the coverage of a second base station during the *Mobile Station Idle State*. The mobile station determines that an idle handoff should occur when it detects a sufficiently strong Pilot Channel signal other than that of the current base station's Pilot Channel signal.

Pilot Channels are identified by their offsets relative to the zero offset pilot PN sequence (see 7.1.3.2.1). Pilot offsets are grouped into sets describing their status with regard to pilot searching.

The following sets of pilot offsets are defined for a mobile station in the *Mobile Station Idle State*. Each pilot offset is a member of only one set.

- Active Set: The pilot offset of the Forward CDMA Channel whose Paging Channel is being monitored.
- Neighbor Set: The offsets of the Pilot Channels that are likely candidates for idle handoff. The members of the Neighbor Set are specified in the *Neighbor List Message*.
- Remaining Set: The set of all possible pilot offsets in the current system (integer multiples of  $\text{PILOT\_INC}_S$ ) on the current CDMA frequency assignment, excluding the pilots in the Neighbor Set and the Active Set.

The mobile station shall be capable of storing the information from the *Neighbor List Message* for at least  $N_{8m}$  members of the neighbor set (see Appendix D).

In the *Mobile Station Idle State*, the mobile station shall continuously search for the strongest Pilot Channel signal on the current CDMA frequency assignment (CDMACH<sub>S</sub>). Search performance criteria are defined in the “Recommended Minimum Performance Standards for 800 MHz Wideband Spread Spectrum Dual-Mode Mobile Stations.”

This search should be governed by the following:

- Active Set: The search window size for each pilot in the Active Set should be the number of PN chips specified in Table 6.6.6.2.1-1 corresponding to SRCH\_WIN\_A<sub>S</sub>. The mobile station should center the search window for each pilot of the Active Set around the earliest arriving usable multipath component of the pilot.
- Neighbor Set: The search window size for each pilot in the Neighbor Set should be the number of PN chips specified in Table 6.6.6.2.1-1 corresponding to SRCH\_WIN\_N<sub>S</sub>. The mobile station should center the search window for each pilot in the Neighbor Set around the pilot’s PN sequence offset using timing defined by the mobile station’s time reference (see 6.1.5.1).
- Remaining Set: The search window size for each pilot in the Remaining Set should be the number of PN chips specified in Table 6.6.6.2.1-1 corresponding to SRCH\_WIN\_R<sub>S</sub>. The mobile station should center the search window for each pilot in the Remaining Set around the pilot’s PN sequence offset using timing defined by the mobile station’s time reference (see 6.1.5.1).

If the mobile station determines that one of the Neighbor Set or Remaining Set Pilot Channel signals is sufficiently stronger than the Pilot Channel of the Active Set, the mobile station should perform idle handoff as specified in 6.6.2.1.4.2.

#### 6.6.2.1.4.2 Idle Handoff Procedures

While performing an idle handoff, the mobile station shall operate in the non-slotted mode until the mobile station has received at least one valid message on the new Paging Channel.

If the new base station is listed in the *Neighbor List Message*, the mobile station shall use the 3-bit NGHBR\_CONFIG field to determine the actions required to transition to the new base station. If the new base station is not listed in the *Neighbor List Message*, the mobile station shall perform the handoff operation using the same procedure as for a pilot in the list with the NGHBR\_CONFIG field set to ‘011’.

If the NGHBR\_CONFIG field is ‘000’, the mobile station shall set ACC\_MSG\_SEQ<sub>S</sub> to NULL (see 6.6.2.2) and shall set PILOT\_PN<sub>S</sub> to the pilot offset index of the base station transmitting the new Paging Channel. If the mobile station has not stored configuration parameters for the new Paging Channel, or if the stored information is not current (see 6.6.2.2), the mobile station shall set CONFIG\_MSG\_SEQ<sub>S</sub>, SYS\_PAR\_MSG\_SEQ<sub>S</sub>, NGHBR\_LST\_MSG\_SEQ<sub>S</sub>, and CHAN\_LST\_MSG\_SEQ<sub>S</sub> to NULL. The mobile station shall begin monitoring the Paging Channel of the new base station, using the same Code Channel and CDMA Channel.



1 If the NGHBR\_CONFIG field is '001', the mobile station shall set ACC\_MSG\_SEQ<sub>s</sub> to NULL  
2 and shall set PILOT\_PN<sub>s</sub> to the pilot offset index of the base station transmitting the new  
3 Paging Channel. If the mobile station has not stored configuration parameters for the  
4 Primary Paging Channel of the new base station, or if the stored information is not current  
5 (see 6.6.2.2), the mobile station shall set CONFIG\_MSG\_SEQ<sub>s</sub>, SYS\_PAR\_MSG\_SEQ<sub>s</sub>,  
6 NGHBR\_LST\_MSG\_SEQ<sub>s</sub>, and CHAN\_LST\_MSG\_SEQ<sub>s</sub> to NULL. The mobile station shall  
7 begin monitoring the Primary Paging Channel of the new base station, using the same  
8 CDMA Channel.

9 If the NGHBR\_CONFIG field is '010', the mobile station shall set ACC\_MSG\_SEQ<sub>s</sub> to NULL  
10 and shall set PILOT\_PN<sub>s</sub> to the pilot offset index of the base station transmitting the new  
11 Paging Channel. If the mobile station has not stored configuration parameters for the  
12 Primary Paging Channel of the new base station, or if the stored information is not current  
13 (see 6.6.2.2), the mobile station shall set CONFIG\_MSG\_SEQ<sub>s</sub>, SYS\_PAR\_MSG\_SEQ<sub>s</sub>,  
14 NGHBR\_LST\_MSG\_SEQ<sub>s</sub> and CHAN\_LST\_MSG\_SEQ<sub>s</sub> to NULL. The mobile station shall  
15 tune to the first CDMA Channel given in the *CDMA Channel List Message* for the new base  
16 station and begin monitoring the Primary Paging Channel of the new base station.

17 If the NGHBR\_CONFIG field is '011', the mobile station shall enter the *Sync Channel*  
18 *Acquisition Substate* of the *Mobile Station Initialization State*.

#### 19 6.6.2.2 Response to Overhead Information Operation

20 The *Response to Overhead Information Operation* is performed whenever the mobile station  
21 receives an overhead message (*System Parameters Message*, *CDMA Channel List Message*,  
22 *Neighbor List Message* or *Access Parameters Message*). The mobile station updates  
23 internally stored information from the received message's data fields.

24 Configuration information and access parameters are received in the configuration  
25 messages and the *Access Parameters Message*. The configuration messages are:

- 26 • *System Parameters Message*
- 27 • *CDMA Channel List Message*
- 28 • *Neighbor List Message*

29 Associated with the set of configuration messages sent on each Paging Channel is a  
30 configuration message sequence number (CONFIG\_MSG\_SEQ). When the contents of one  
31 or more of the configuration messages change, the configuration message sequence number  
32 is incremented. For each of the configuration messages received, the mobile station stores  
33 the configuration message sequence number contained in the configuration message  
34 (SYS\_PAR\_MSG\_SEQ<sub>s</sub>, CHAN\_LIST\_MSG\_SEQ<sub>s</sub>, NGHBR\_LIST\_MSG\_SEQ<sub>s</sub>). The mobile  
35 station also stores the most recently received configuration message sequence number  
36 (CONFIG\_MSG\_SEQ<sub>s</sub>) contained in any message. (See 6.6.2.2.1, 6.6.2.2.3, 6.6.2.2.4 and  
37 6.6.2.3.) The mobile station examines the stored values of the configuration message  
38 sequence numbers to determine whether the configuration parameter values stored by the  
39 mobile station are current.

The configuration message sequence number is also included in the *Page Message* and the *Slotted Page Message*. This allows the mobile station to determine whether the stored configuration parameters are current without waiting for a configuration message.

*Access Parameters Messages* are independently sequence-numbered by the ACC\_MSG\_SEQ field. The mobile station stores the most recently received *Access Parameters Message* sequence number (ACC\_MSG\_SEQ<sub>s</sub>).

Paging Channels shall be considered different if they are transmitted by different base stations, if they are transmitted on different code channels, or if they are transmitted on different CDMA Channels. Configuration and access parameters from one Paging Channel shall not be used while monitoring a different Paging Channel. The mobile station shall ignore any overhead message whose PILOT\_PN<sub>r</sub> field is not equal to the pilot offset index (PILOT\_PN<sub>s</sub>) of the base station whose Paging Channel is being monitored.

The mobile station may store the configuration message parameters from Paging Channels it has recently monitored. When a mobile station performs an idle handoff (see 6.6.2.1.4.2) or other transition to a Paging Channel that it has recently monitored, the mobile station can determine whether the stored parameters are current by examining the CONFIG\_MSG\_SEQ<sub>s</sub> in a configuration message, in a *Slotted Page Message*, or in a *Page Message*.

The mobile station shall define a special value, NULL, to be stored in place of sequence numbers for messages that have not been received or are marked as not current. The special value NULL shall be unequal to any valid message sequence number.

The mobile station shall consider the stored configuration parameters to be current only if all the following conditions are true:

- All three stored configuration message sequence numbers (SYS\_PAR\_MSG\_SEQ<sub>s</sub>, CHAN\_LIST\_MSG\_SEQ<sub>s</sub>, NGHBR\_LIST\_MSG\_SEQ<sub>s</sub>) are equal to CONFIG\_MSG\_SEQ<sub>s</sub>; and
- CONFIG\_MSG\_SEQ<sub>s</sub> is not equal to NULL; and
- No more than T<sub>31m</sub> seconds (see Appendix D) have elapsed since the mobile station last received a valid message on the Paging Channel for which the parameters were stored.

#### 6.6.2.2.1 System Parameters Message

Whenever a *System Parameters Message* is received on the Paging Channel, the configuration message sequence number, CONFIG\_MSG\_SEQ<sub>r</sub>, shall be compared to that stored in SYS\_PAR\_MSG\_SEQ<sub>s</sub>. If the comparison results in a mismatch, then the mobile station shall process the remaining fields in the message as described in 6.6.2.2.1.1, 6.6.2.2.1.2, 6.6.2.2.1.3, 6.6.2.2.1.4, and 6.6.2.2.1.5.

##### 6.6.2.2.1.1 Stored Parameters

The mobile station shall store the following parameters:

- 1 • Configuration message sequence number  
2 (CONFIG\_MSG\_SEQ<sub>S</sub> = CONFIG\_MSG\_SEQ<sub>R</sub>,  
3 SYS\_PAR\_MSG\_SEQ<sub>S</sub> = CONFIG\_MSG\_SEQ<sub>R</sub>)
- 4 • System identification (SID<sub>S</sub> = SID<sub>R</sub>)
- 5 • Network identification (NID<sub>S</sub> = NID<sub>R</sub>)
- 6 • Registration zone (REG\_ZONE<sub>S</sub> = REG\_ZONE<sub>R</sub>)
- 7 • Number of registration zones to be retained (TOTAL\_ZONES<sub>S</sub> = TOTAL\_ZONES<sub>R</sub>)
- 8 • Zone timer length (ZONE\_TIMER<sub>S</sub> = ZONE\_TIMER<sub>R</sub>)
- 9 • Base station identification (BASE\_ID<sub>S</sub> = BASE\_ID<sub>R</sub>)
- 10 • Base station class (BASE\_CLASS<sub>S</sub> = BASE\_CLASS<sub>R</sub>)
- 11 • Home registration indicator (HOME\_REG<sub>S</sub> = HOME\_REG<sub>R</sub>)
- 12 • NID roamer registration indicator (FOR\_NID\_REG<sub>S</sub> = FOR\_NID\_REG<sub>R</sub>)
- 13 • SID roamer registration indicator (FOR\_SID\_REG<sub>S</sub> = FOR\_SID\_REG<sub>R</sub>)
- 14 • Power-up registration indicator (POWER\_UP\_REG<sub>S</sub> = POWER\_UP\_REG<sub>R</sub>)
- 15 • Power-down registration indicator (POWER\_DOWN\_REG<sub>S</sub> = POWER\_DOWN\_REG<sub>R</sub>)
- 16 • Parameter-change registration indicator (PARAMETER\_REG<sub>S</sub> = PARAMETER\_REG<sub>R</sub>)
- 17 • Registration period (REG\_PRD<sub>S</sub> = REG\_PRD<sub>R</sub>)
- 18 • Base station latitude (BASE\_LAT<sub>S</sub> = BASE\_LAT<sub>R</sub>)
- 19 • Base station longitude (BASE\_LONG<sub>S</sub> = BASE\_LONG<sub>R</sub>)
- 20 • Registration distance (REG\_DIST<sub>S</sub> = REG\_DIST<sub>R</sub>)
- 21 • Search window size for the Active Set and Candidate Set  
22 (SRCH\_WIN\_A<sub>S</sub> = SRCH\_WIN\_A<sub>R</sub>)
- 23 • Search window size for the Neighbor Set (SRCH\_WIN\_N<sub>S</sub> = SRCH\_WIN\_N<sub>R</sub>)
- 24 • Search window size for the Remaining Set (SRCH\_WIN\_R<sub>S</sub> = SRCH\_WIN\_R<sub>R</sub>)
- 25 • Maximum age for retention of Neighbor Set members  
26 (NGHBR\_MAX\_AGE<sub>S</sub> = NGHBR\_MAX\_AGE<sub>R</sub>)
- 27 • Power control reporting frame count (PWR\_REP\_FRAMES<sub>S</sub> = PWR\_REP\_FRAMES<sub>R</sub>)
- 28 • Power control reporting threshold (PWR\_REP\_THRESH<sub>S</sub> = PWR\_REP\_THRESH<sub>R</sub>)
- 29 • Power report mode indicator (PWR\_REP\_MODE<sub>S</sub> = PWR\_REP\_MODE<sub>R</sub>)
- 30 • Power report delay (PWR\_REP\_DELAY<sub>S</sub> = PWR\_REP\_DELAY<sub>R</sub>)
- 31 • Pilot detection threshold (T\_ADD<sub>S</sub> = T\_ADD<sub>R</sub>)
- 32 • Pilot drop threshold (T\_DROP<sub>S</sub> = T\_DROP<sub>R</sub>)
- 33 • Active Set versus Candidate Set comparison threshold (T\_COMP<sub>S</sub> = T\_COMP<sub>R</sub>)
- 34 • Drop timer value (T\_TDROPS = T\_TDROPS<sub>R</sub>)

#### 6.6.2.2.1.2 Paging Channel Assignment Change

If the number of Paging Channels specified in the message ( $PAGE\_CHAN_R$ ) is different from  $PAGE\_CHAN_S$ , the mobile station shall use the hash algorithm specified in 6.6.7.1 to select a new Paging Channel number in the range 1 to  $PAGE\_CHAN_R$ . The mobile station shall store the new Paging Channel number as  $PAGECH_S$ . The mobile station shall then set  $PAGE\_CHAN_S$  to  $PAGE\_CHAN_R$ . The mobile station shall set  $ACC\_MSG\_SEQ_S$  to NULL. If the mobile station has not stored configuration parameters for the new Paging Channel, or if the stored parameters are not current (see 6.6.2.2), the mobile station shall set  $CONFIG\_MSG\_SEQ_S$ ,  $SYS\_PAR\_MSG\_SEQ_S$ ,  $NGHBR\_LST\_MSG\_SEQ_S$ , and  $CHAN\_LST\_MSG\_SEQ_S$  to NULL. The mobile station shall then begin monitoring the new Paging Channel as specified in 6.6.2.1.1.

#### 6.6.2.2.1.3 RESCAN Parameter

If the  $RESCAN_R$  field in the *System Parameters Message* equals '1', the mobile station shall enter the *System Determination Substate* of the *Mobile Station Initialization State*.

#### 6.6.2.2.1.4 Roaming Status

The mobile station shall determine the roaming status for each of the MINs active at the mobile station (see 6.6.5.3). The mobile station should indicate to the user whether any MIN active at the mobile station is roaming.<sup>19</sup>

#### 6.6.2.2.1.5 Registration

The mobile station shall update stored variables and perform other registration procedures as specified in 6.6.5.6.2.2.

#### 6.6.2.2.2 Access Parameters Message

Whenever an *Access Parameters Message* is received on the Paging Channel, the sequence number,  $ACC\_MSG\_SEQ_R$ , shall be compared to  $ACC\_MSG\_SEQ_S$ . If the comparison results in a mismatch, then the mobile station shall process the remaining fields in the message as follows.

The mobile station shall store the following parameters:

- *Access Parameters Message* sequence number ( $ACC\_MSG\_SEQ_S = ACC\_MSG\_SEQ_R$ )
- Number of Access Channels ( $ACC\_CHAN_S = ACC\_CHAN_R$ )
- Nominal transmit power offset ( $NOM\_PWR_S = NOM\_PWR_R$ )
- Initial power offset for access ( $INIT\_PWR_S = INIT\_PWR_R$ )
- Power increment ( $PWR\_STEP_S = PWR\_STEP_R$ )
- Number of access probes ( $NUM\_STEP_S = NUM\_STEP_R$ )

---

<sup>19</sup>If the mobile station user has entered a particular MIN, e.g., prior to an origination, then the mobile station should indicate whether that MIN is roaming.

- 1 • Maximum Access Channel message capsule size ( $\text{MAX\_CAP\_SZ}_S = \text{MAX\_CAP\_SZ}_R$ )
- 2 • Access Channel preamble length ( $\text{PAM\_SZ}_S = \text{PAM\_SZ}_R$ )
- 3 • Persistence modifier for Access Channel attempts for registrations which are not
- 4 responses to the *Registration Request Order* ( $\text{REG\_PSIST}_S = \text{REG\_PSIST}_R$ )
- 5 • Persistence modifier for Access Channel attempts for message transmissions
- 6 ( $\text{MSG\_PSIST}_S = \text{MSG\_PSIST}_R$ )
- 7 • Time randomization for Access Channel probes ( $\text{PROBE\_PN\_RAN}_S = \text{PROBE\_PN\_RAN}_R$ )
- 8 • Acknowledgement timeout ( $\text{ACC\_TMO}_S = \text{ACC\_TMO}_R$ )
- 9 • Access Channel probe backoff range ( $\text{PROBE\_BKOFF}_S = \text{PROBE\_BKOFF}_R$ )
- 10 • Access Channel probe sequence backoff range ( $\text{BKOFF}_S = \text{BKOFF}_R$ )
- 11 • Maximum number of probe sequences for an Access Channel request
- 12 ( $\text{MAX\_REQ\_SEQ}_S = \text{MAX\_REQ\_SEQ}_R$ )
- 13 • Maximum number of probe sequences for an Access Channel response
- 14 ( $\text{MAX\_RSP\_SEQ}_S = \text{MAX\_RSP\_SEQ}_R$ )
- 15 • Authentication mode ( $\text{AUTH}_S = \text{AUTH}_R$ )
- 16 • Random challenge value ( $\text{RAND}_S = \text{RAND}_R$ )

17 For each MIN active at the mobile station, the mobile station shall record the persistence  
18 parameter number that corresponds to the MIN's overload class as follows:

- 19 • Persistence value for access overload class ( $\text{PSIST}_S = \text{PSIST}_R$ )

#### 20 6.6.2.2.3 Neighbor List Message

21 Whenever a valid *Neighbor List Message* is received on the current Paging Channel  
22 ( $\text{PAGECH}_S$ ), the configuration message sequence number,  $\text{CONFIG\_MSG\_SEQ}_R$ , shall be  
23 compared to that stored in  $\text{NGHBR\_LST\_MSG\_SEQ}_S$ . If the comparison results in a  
24 mismatch, then the mobile station shall process the remaining fields in the message as  
25 follows.

26 The mobile station shall store the following parameters:

- 27 • Configuration message sequence number  
28 ( $\text{CONFIG\_MSG\_SEQ}_S = \text{CONFIG\_MSG\_SEQ}_R$ ,  
29  $\text{NGHBR\_LST\_MSG\_SEQ}_S = \text{CONFIG\_MSG\_SEQ}_R$ )
- 30 • Pilot PN sequence offset increment ( $\text{PILOT\_INC}_S = \text{PILOT\_INC}_R$ )

31 For each of the neighboring base stations contained in the *Neighbor List Message*, the  
32 mobile station shall store the following:

- 33 • Neighbor configuration ( $\text{NGHBR\_CONFIG}_S = \text{NGHBR\_CONFIG}_R$ )
- 34 • Neighbor pilot PN sequence offset ( $\text{NGHBR\_PN}_S = \text{NGHBR\_PN}_R$ )

35 The mobile station shall update the idle handoff Neighbor Set and Remaining Set (see  
36 6.6.2.1.4) so that the Neighbor Set consists only of pilot offsets listed in the *Neighbor List*

1 *Message*. If the *Neighbor List Message* contains more pilot offsets than the mobile station  
 2 can store, the mobile station shall store the pilot offsets beginning at the start of the  
 3 *Neighbor List Message*, up to the limits of the mobile station's Neighbor Set storage  
 4 capacity.

#### 5 6.6.2.2.4 CDMA Channel List Message

6 Whenever a *CDMA Channel List Message* is received on the Paging Channel, the  
 7 configuration message sequence number, CONFIG\_MSG\_SEQ<sub>R</sub>, shall be compared to that  
 8 stored in CHAN\_LST\_MSG\_SEQ<sub>S</sub>. If the comparison results in a mismatch, then the mobile  
 9 station shall process the remaining fields in the message as follows.

10 The mobile station shall store the following parameters:

- 11 • Configuration message sequence number  
 12 (CONFIG\_MSG\_SEQ<sub>S</sub> = CONFIG\_MSG\_SEQ<sub>R</sub>,  
 13 CHAN\_LST\_MSG\_SEQ<sub>S</sub> = CONFIG\_MSG\_SEQ<sub>R</sub>)

14 The mobile station shall use the hash algorithm specified in 6.6.7.1 and the number of  
 15 channels listed in the *CDMA Channel List Message* to determine the CDMA Channel  
 16 (frequency assignment) for its Paging Channel. If the CDMA frequency assignment has  
 17 changed (the computed CDMA Channel is different from CDMACH<sub>S</sub>), the mobile station  
 18 shall perform the following actions:

- 19 • Set CDMACH<sub>S</sub> to the new CDMA Channel.
- 20 • Set PAGECH<sub>S</sub> to the Primary Paging Channel.
- 21 • Set CONFIG\_MSG\_SEQ<sub>S</sub>, SYS\_PAR\_MSG\_SEQ<sub>S</sub>, NGHBR\_LST\_MSG\_SEQ<sub>S</sub>,  
 22 CHAN\_LST\_MSG\_SEQ<sub>S</sub>, and ACC\_MSG\_SEQ<sub>S</sub> to NULL.
- 23 • Tune to the new CDMA Channel.

#### 24 6.6.2.3 Mobile Station Page Match Operation

25 The *Mobile Station Page Match Operation* is performed whenever the mobile station receives  
 26 a *Page Message* or a *Slotted Page Message*. The mobile station searches each message to  
 27 determine whether it contains one of the mobile station's active MINs. If so, the mobile  
 28 station transmits a response to the *Page Message* or the *Slotted Page Message* on the  
 29 Access Channel.

30 The mobile station shall compare the configuration message sequence number, CONFIG-  
 31 \_MSG\_SEQ<sub>R</sub>, to CONFIG\_MSG\_SEQ<sub>S</sub>. If the comparison results in a mismatch, then the  
 32 mobile station shall set CONFIG\_MSG\_SEQ<sub>S</sub> to CONFIG\_MSG\_SEQ<sub>R</sub>. The mobile station  
 33 shall also compare the *Access Parameters Message* sequence number, ACC\_MSG\_SEQ<sub>R</sub>,  
 34 with that stored in ACC\_MSG\_SEQ<sub>S</sub>. If the comparison results in a mismatch, then the  
 35 mobile station shall set ACC\_MSG\_SEQ<sub>S</sub> to NULL (see 6.6.2.2).

36 The mobile station shall compare each of its active MINs with the MIN in each record of the  
 37 *Page Message* or *Slotted Page Message*. If both MIN1 and MIN2 are present in a page  
 38 record and both MIN1 and MIN2 match MIN1 and MIN2 for an active MIN at the mobile  
 39 station, then a match shall be declared. If MIN1 but not MIN2 is present in a page record,

MIN1 matches MIN1 for an active MIN at the mobile station, and a home (SID, NID) pair for the same active MIN matches the SID and NID of the base station, then a match shall be declared (see 6.6.5.3). Any other combination shall be considered a mismatch.

If a match is declared, and the MIN is configured to receive mobile station terminated calls in its present roaming status (see 6.6.5.3), the mobile station shall enter the *Update Overhead Information Substate* of the *System Access State* (see 6.6.3) with a page response indication within  $T_{33m}$  seconds after the page message is received.

If the MIN is not configured to receive mobile station terminated calls in its present roaming status, the mobile station may ignore the page record.

#### 6.6.2.4 Mobile Station Order and Message Processing Operation

During the *Mobile Station Order and Message Processing Operation*, the mobile station processes mobile station directed messages (addressed by ESN), including order messages. Directed messages include all messages except overhead messages and page messages.

The mobile station shall compare its ESN to the ESN field of the message. If the ESN matches, the mobile station shall process the message; otherwise the mobile station shall ignore the message.

The following cases occur for messages received on the Paging Channel whose ESN field matches the mobile station's ESN:

- If the message requires acknowledgement, and is not the *Lock Order*, the *Lock Until Power-Cycled Order*, or the *Unlock Order*, the mobile station shall acknowledge the message as specified in 6.6.2.1.2. The mobile station shall enter the *Update Overhead Information Substate* of the *System Access State* with an order/message response indication within  $T_{33m}$  seconds, unless otherwise specified for a particular message.
- If the message does not require acknowledgement, the mobile station shall transmit a response only if it is required by the message or order. If a response is required, the mobile station shall enter the *Update Overhead Information Substate* of the *System Access State* with an order/message response indication within  $T_{33m}$  seconds, unless otherwise specified for a particular message.
- If the message is a message that cannot be processed by the mobile station, the mobile station shall respond with a *Mobile Station Reject Order* with the ORDQ field set to indicate the reason for rejection. The mobile station shall enter the *Update Overhead Information Substate* of the *System Access State* with an order/message response indication within  $T_{33m}$  seconds, unless otherwise specified for a particular message.

The following directed messages and orders can be received. If any field value of the message is outside its permissible range, the mobile station shall send a *Mobile Station Reject Order* with ORDQ equal to '00000100' (message field not in valid range) or '00000010' (message not accepted in this state), as appropriate.

1. *Abbreviated Alert Order*: The mobile station shall compare each of its active MINs with the MIN specified in the *Abbreviated Alert Order*. If the received MIN1 and

MIN2 match the MIN1 and MIN2 for an active MIN at the mobile station, then the mobile station may alert the user.

2. *Added MIN Rejected Order*; No requirements.
3. *Authentication Challenge Message*: The mobile station shall process the message and shall respond with an *Authentication Challenge Response Message* as specified in 6.3.12.1.5. The mobile station shall enter the *Update Overhead Information Substate* of the *System Access State* with an order/message response indication within  $T_{32m}$  seconds
4. *Base Station Acknowledgement Order*: No requirements.
5. *Base Station Challenge Confirmation Order*: The mobile station shall process the message and shall respond with an *SSD Update Confirmation Order* or *SSD Update Rejection Order* as specified in 6.3.12.1.9. The mobile station shall enter the *Update Overhead Information Substate* of the *System Access State* with an order/message response indication within  $T_{32m}$  seconds.
6. *Channel Assignment Message*: If the message specifies a Paging Channel assignment (ASSIGN\_MODE equal to '001'), the mobile station shall store the specified CDMA Channel ( $CDMACH_s = CDMA\_FREQ_r$ ) and Paging Channel ( $PAGECH_s = CODE\_CHAN_r$ ). The mobile station shall set CONFIG\_MSG\_SEQ\_s, SYS\_PAR\_MSG\_SEQ\_s, NGHBR\_LST\_MSG\_SEQ\_s, CHAN\_LST\_MSG\_SEQ\_s, and ACC\_MSG\_SEQ\_s to NULL and begin monitoring the new Paging Channel.  
  
If the ASSIGN\_MODE field is any value other than '001', the mobile station shall respond with a *Mobile Station Reject Order* with ORDQ equal to '00000010' (message not accepted in this state).
7. *Data Burst Message*: No requirements.
8. *Local Control Order*: No requirements.
9. *Lock Order*: The mobile station shall record the reason for the *Lock Order* in the mobile station's semi-permanent memory ( $LCKRSN_{s-p} = ORDQ_r$ ). After a mobile station receives this order, it shall not enter the *System Access State* (see 6.6.3) until it has received an *Unlock Order*. This requirement shall take precedence over any other mobile station requirement specifying entry to the *System Access State*. The mobile station should notify the user of the locked condition. The mobile station may exit the *Mobile Station Idle State* and enter the *System Determination Substate* of the *Mobile Station Initialization State*.
10. *Lock Until Power-Cycled Order*: The mobile station shall record the reason for the *Lock Order* in the mobile station's semi-permanent memory ( $LCKRSN_{s-p} = ORDQ_r$ ). After a mobile station receives this order, it shall not enter the *System Access State* (see 6.6.3) until it has received an *Unlock Order* or until after power-cycling the mobile station (i.e., after the next mobile station power-up). This requirement shall take precedence over any other mobile station requirement specifying entry to the *System Access State*. The mobile station should notify the user of the locked condition. The mobile station may exit the *Mobile Station Idle State* and enter the *System Determination Substate* of the *Mobile Station Initialization State*.



11. Message Waiting Order: No requirements.

12. Registration Accepted Order: No requirements.

13. Registration Rejected Order: No requirements.

14. Registration Request Order: The mobile station shall process the message and perform registration procedures as specified in 6.6.5.6.2.3.

15. SSD Update Message: The mobile station shall process the message and shall respond with a *Base Station Challenge Order* as specified in 6.3.12.1.9. The mobile station shall enter the *Update Overhead Information Substate* of the *System Access State* with an order/message response indication within  $T_{32m}$  seconds.

16. Unlock Order: After receiving this order, the mobile station is no longer locked. The mobile station should notify the user that the locked condition has been removed. The mobile station shall enter the *System Determination Substate* of the *Mobile Station Initialization State*.

If any message or order is received that is not listed above, the mobile station shall respond with a *Mobile Station Reject Order* with ORDQ equal to '00000010' (message not accepted in this state).

#### 6.6.2.5 Mobile Station Origination Operation

The *Mobile Station Origination Operation* is performed when the mobile station is directed by the user to initiate a call.

The mobile station shall enter the *Update Overhead Information Substate* of the *System Access State* (see 6.6.3) with a call origination indication within  $T_{33m}$  seconds.

#### 6.6.2.6 Mobile Station Message Transmission Operation

Support of this operation is optional. If the mobile station supports the *Mobile Station Message Transmission Operation*, the operation is performed when the user directs the mobile station to transmit a message.

If the mobile station supports this operation, the mobile station shall enter the *Update Overhead Information Substate* of the *System Access State* (see 6.6.3) with a message transmission indication within  $T_{33m}$  seconds.

#### 6.6.2.7 Mobile Station Power-Down Operation

The *Mobile Station Power-Down Operation* is performed when the user directs the mobile station to power down.

The mobile station shall update stored parameters and perform other registration procedures as specified in 6.6.5.6.2.4.

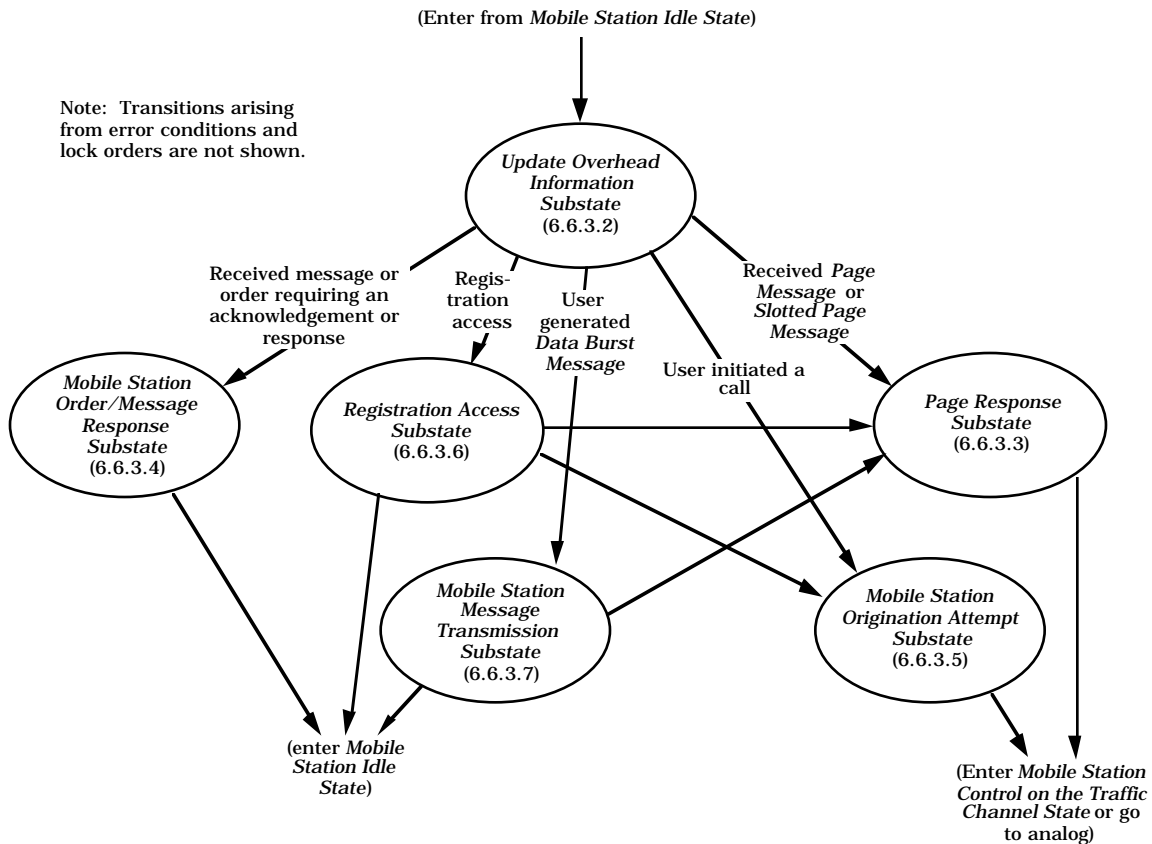
If no power-down registration is performed (see 6.6.5.6.2.4), the mobile station may power down.

### 6.6.3 System Access State

In this state, the mobile station sends messages to the base station on the Access Channel(s) and receives messages from the base station on the Paging Channel.

As illustrated in Figure 6.6.3-1, the System Access State consists of the following substates:

- *Update Overhead Information Substate* - In this substate, the mobile station monitors the Paging Channel until it has received a current set of configuration messages.
- *Mobile Station Origination Attempt Substate* - In this substate, the mobile station sends an *Origination Message* to the base station.
- *Page Response Substate* - In this substate, the mobile station sends a *Page Response Message* to the base station.
- *Mobile Station Order/Message Response Substate* - In this substate, the mobile station sends a response to a message received from the base station.
- *Registration Access Substate* - In this substate, the mobile station sends a *Registration Message* or *Registration Update Message* to the base station.
- *Mobile Station Message Transmission Substate* - In this substate, the mobile station sends a *Data Burst Message* to the base station.



**Figure 6.6.3-1. System Access State**

### 6.6.3.1 Access Procedures

#### 6.6.3.1.1 Access Attempts

##### 6.6.3.1.1.1 Overview

The mobile station transmits on the Access Channel using a random access protocol. Many parameters of the random access protocol are supplied by the base station in the *Access Parameters Message*. The mobile station transmits a single message repeatedly until it receives an acknowledgement from the base station on the Paging Channel. Each transmission is called an access probe. The entire process of sending one message and receiving (or failing to receive) an acknowledgement for that message is called an access attempt (see Figures 6.6.3.1.1.1-1 and 6.6.3.1.1.1-2).

Within an access attempt, access probes are grouped into access probe sequences. Each access probe sequence consists of up to  $\text{NUM\_STEP} + 1$  access probes, all transmitted on the same Access Channel. The Access Channel used for each access probe sequence is chosen pseudorandomly from among all the Access Channels associated with the current Paging Channel. The first access probe of each access probe sequence is transmitted at a specified power level relative to the nominal open loop power level. Each subsequent access probe is transmitted at a power level a specified amount higher than the previous access probe (see 6.1.2.3.1).

The timing of access probes and access probe sequences is expressed in terms of Access Channel slots (see 6.7.1.1). Each slot is the length of one Access Channel transmission (access probe) and each access probe occurs in a particular slot.

The timing of the start of each access probe sequence is determined pseudorandomly. Different procedures are used for sending a response message (one that is a response to a base station message) and for sending a request message (one that is sent autonomously by the mobile station). For every access probe sequence except the first access probe sequence of a request access attempt, a backoff delay  $RS$  of between 0 and  $BKOFF + 1$  slots is generated pseudorandomly. For a response access probe sequence, the first access probe of the sequence begins after  $RS$  slots. For request access probe sequences only, an additional delay is imposed by the use of a persistence test.<sup>20</sup> For each slot after the backoff delay  $RS$ , the mobile station performs a pseudorandom test, with parameters that depend on the reason for the access attempt and the access overload class ( $ACCOLC_p$ ) of the mobile station. If the test passes, the first access probe of the sequence begins in that slot. If the test fails, the access probe sequence is deferred until at least the next slot.

Timing between access probes of an access probe sequence is also generated pseudorandomly. After transmitting each access probe, the mobile station waits a specified period  $TA = ACC\_TMO \times 80$  ms to receive an acknowledgement from the base station. If an acknowledgement is received, the access attempt ends. If no acknowledgement is received,

---

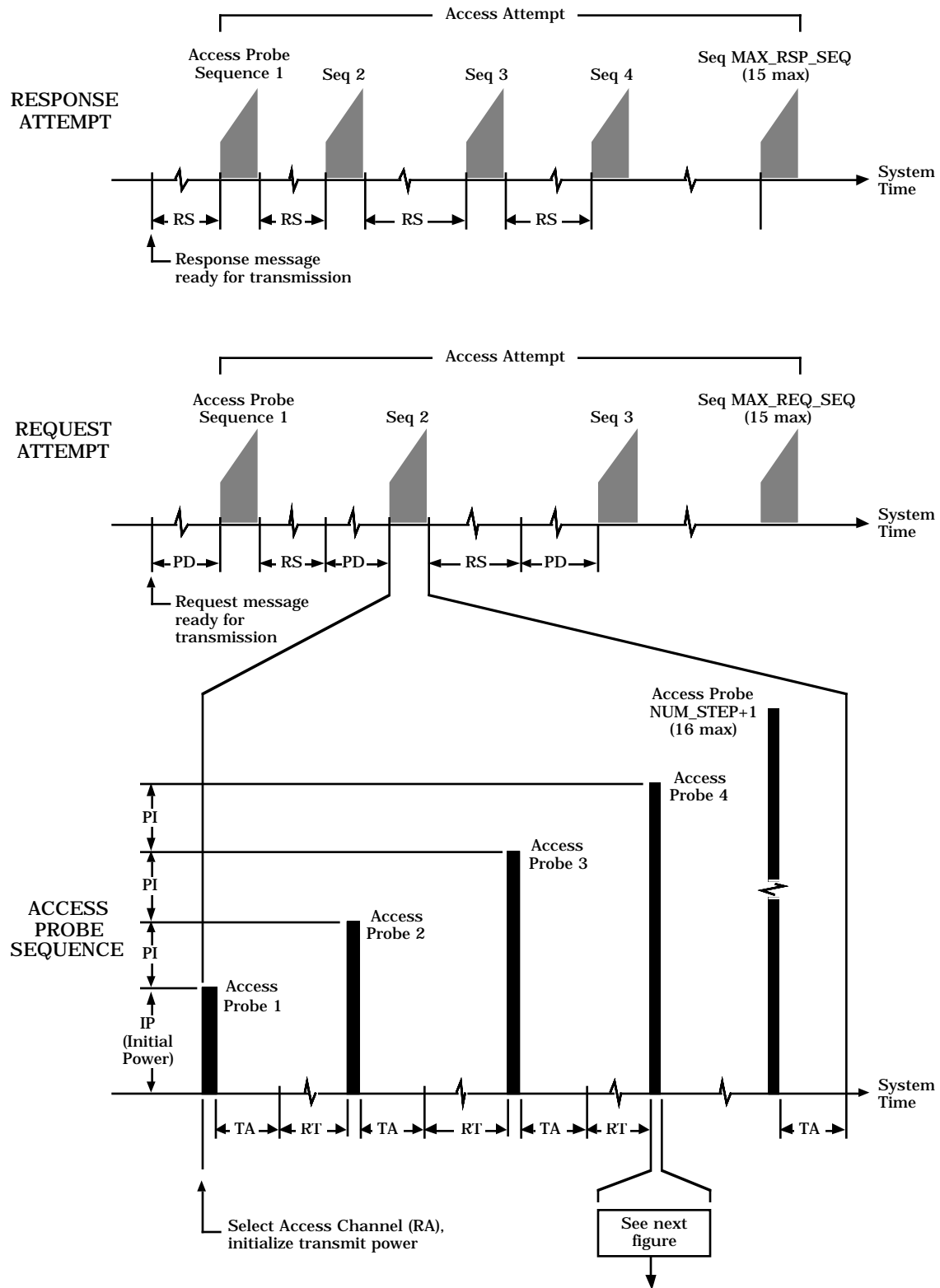
<sup>20</sup>A persistence test is not needed for response access attempts, because the base station controls the arrival rate of response messages directly by controlling the rate at which it transmits messages requiring responses.

1 the next access probe is transmitted after an additional backoff delay RT of between 0 and  
2 PROBE\_BKOFF + 1 slots.

3 The precise timing of the Access Channel transmissions in an access attempt is determined  
4 by a procedure called PN randomization. For each access attempt, the mobile station  
5 computes a delay RN of from 0 to  $2^{\text{PROBE\_PN\_RAN}} - 1$  PN chips using a (non-random) hash  
6 function that depends on its ESN. The mobile station delays its transmit timing by RN  
7 PN chips. This transmit timing adjustment includes delay of the direct sequence spreading  
8 long code and of the quadrature spreading I and Q pilot PN sequences, so it effectively  
9 increases the apparent range from the mobile station to the base station.<sup>21</sup>

---

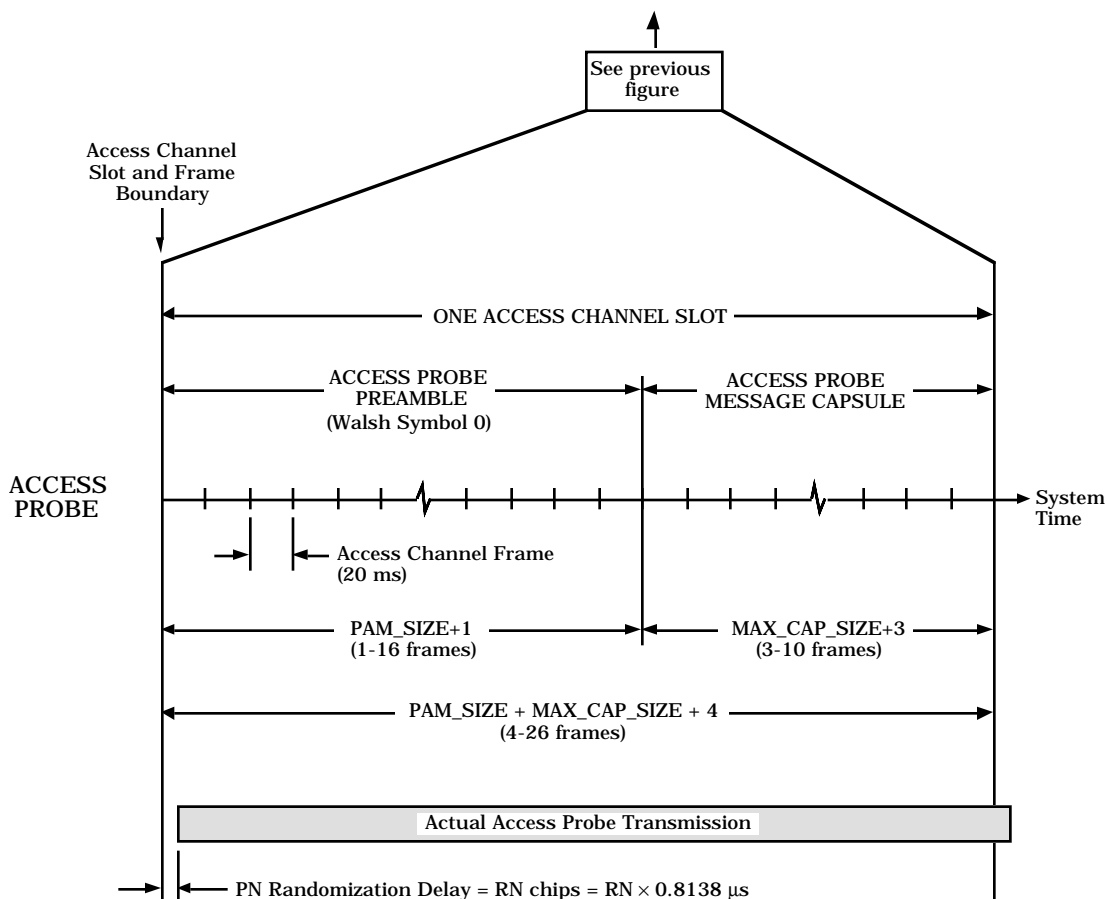
<sup>21</sup>This increases the probability that the base station will be able to separately demodulate transmissions from multiple mobile stations in the same Access Channel slot, especially when many mobile stations are at a similar range from the base station. Use of a non-random algorithm for PN randomization permits the base station to separate the PN randomization from the actual propagation delay from the mobile station, so it can accurately estimate the timing of Reverse Traffic Channel transmissions from the mobile station.



1

2

**Figure 6.6.3.1.1.1-1A. Access Channel Request and Response Attempts**



### Calculated, Random, and Hashed Variables

Variable	Name	Generation	Range	Units
IP	Initial Open-Loop Power	$IP = -73 - \text{Mean Input Power (dBm)} + (0.5 \times \text{NOM\_PWR}) + (0.5 \times \text{INIT\_PWR})$	See Table 6.1.2.1-1	dBm
PD	Persistence Delay	Delay continues slot-by-slot until persistence test (run every slot) passes.	—	slots
PI	Power Increment	$PI = 0.5 \times \text{PWR\_STEP}$	0 to 7.5	dB
RA	Access Channel Number	Random between 0 and ACC_CHAN; generated before every sequence.	0 to 31	—
RN	PN Randomization Delay	Hash using ESN between 0 and $2^{\text{PROBE\_PN\_RAN}} - 1$ ; generated once at beginning of attempt.	0 to 511	chips
RS	Sequence Backoff	Random between 0 and BKOFF+1; generated before every sequence (except the first request sequence).	0 to 16	slots
RT	Probe Backoff	Random between 0 and PROBE_BKOFF+1; generated before subsequent probes.	0 to 16	slots
TA	Ack Response Timeout	$TA = 80 \times \text{ACC\_TMO}$	160 to 5040	ms

**Figure 6.6.3.1.1-1B. Access Channel Request and Response Attempts**

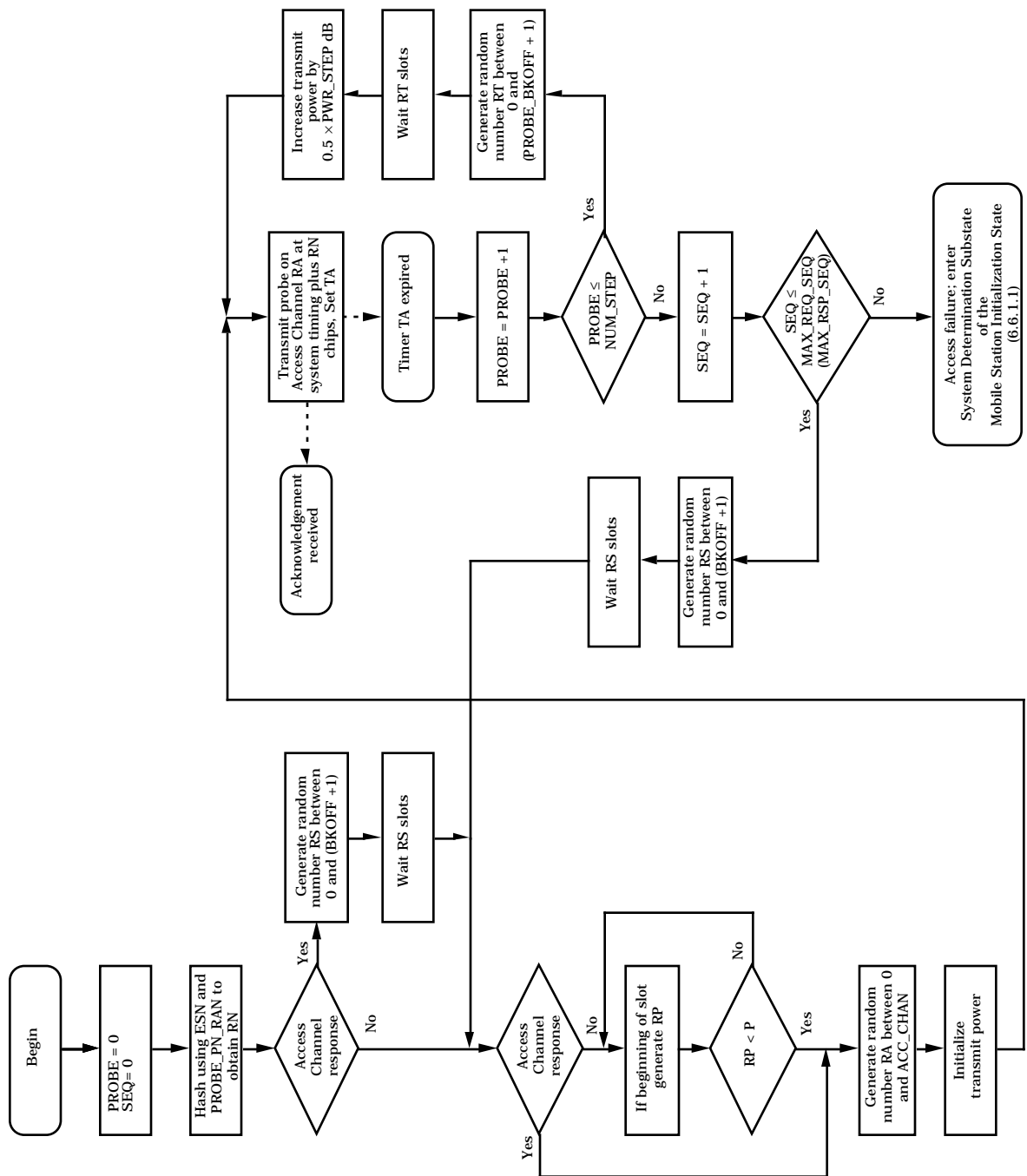


Figure 6.6.3.1.1.1-2. Access Procedure

#### 6.6.3.1.1.2 Requirements

Each time the mobile station performs an access attempt, it shall compute a number,  $RN$ , from 0 to  $2^{\text{PROBE\_PN\_RAN}} - 1$ , using the hashing technique described in 6.6.7.1. For the duration of this access attempt, the mobile station shall delay its transmit timing, including long code direct sequence spreading (see 6.1.3.2.7) and I and Q pilot PN sequence quadrature spreading (see 6.1.3.2.8), by  $RN$  PN chips.

When the mobile station performs an access attempt, it shall transmit one or more access probe sequences. If the access attempt is an Access Channel request, the mobile station shall transmit no more than  $\text{MAX\_REQ\_SEQ}_s$  access probe sequences; if the access attempt is an Access Channel response, the mobile station shall transmit no more than  $\text{MAX\_RSP\_SEQ}_s$  access probe sequences.

Before transmitting each access probe sequence, the mobile station shall generate a random number,  $RA$ , from 0 to  $\text{ACC\_CHAN}_s$  using the procedure described in 6.6.7.2. The mobile station shall use this random number,  $RA$ , as the Access Channel number for all access probes in that access probe sequence (see 6.1.3.1.8).

Before transmitting each access probe sequence of a response attempt and before each access probe sequence other than the first access probe sequence of a request attempt, the mobile station shall generate a random number,  $RS$ , from 0 to  $(\text{BKOFF}_s + 1)$ , using the procedure described in 6.6.7.2. The mobile station shall delay the transmission of the access probe sequence for  $RS$  slots.

If the access attempt is an Access Channel request, then before transmitting the first access probe in each access probe sequence, and after the delay of  $RS$  if applicable, the mobile station shall perform a persistence test for each Access Channel slot until the test passes. When the test passes, the mobile station shall transmit the first access probe in the corresponding slot. To perform the persistence test, the mobile station shall generate a random number  $RP$ ,  $0 \leq RP \leq 1$ , using the technique described in 6.6.7.2. The persistence test is said to pass when  $RP$  is less than the current value of  $P$  for the type of this access attempt. If  $P$  equals 0, the access attempt fails, and the mobile station shall end the access attempt, update its registration variables as specified in 6.6.5.6.3.2, and enter the *System Determination Substate of the Mobile Station Initialization State*.



If the Access Channel request is a registration, P shall be computed<sup>22</sup> by

$$P = \begin{cases} 2^{-\text{PSIST}(n)/4} \times 2^{-\text{REG\_PSIST}} & \text{if PSIST}(n) \neq 63 \\ 0 & \text{otherwise} \end{cases} \quad n = 0, 1, \dots, 9$$

$$P = \begin{cases} 2^{-\text{PSIST}(n)} \times 2^{-\text{REG\_PSIST}} & \text{if PSIST}(n) \neq 7 \\ 0 & \text{otherwise} \end{cases} \quad n = 10, 11, \dots, 15$$

where n is the highest overload class (ACCOLC<sub>p</sub>) assigned to a MIN being actively supported by the mobile station.

If the Access Channel request is a message transmission, P shall be computed by

$$P = \begin{cases} 2^{-\text{PSIST}(n)/4} \times 2^{-\text{MSG\_PSIST}} & \text{if PSIST}(n) \neq 63 \\ 0 & \text{otherwise} \end{cases} \quad n = 0, 1, \dots, 9$$

$$P = \begin{cases} 2^{-\text{PSIST}(n)} \times 2^{-\text{MSG\_PSIST}} & \text{if PSIST}(n) \neq 7 \\ 0 & \text{otherwise} \end{cases} \quad n = 10, 11, \dots, 15$$

where n is the overload class assigned to the MIN sending the message.

If the Access Channel request is other than a registration or a message transmission, P shall be computed by

$$P = \begin{cases} 2^{-\text{PSIST}(n)/4} & \text{if PSIST}(n) \neq 63 \\ 0 & \text{otherwise} \end{cases} \quad n = 0, 1, \dots, 9$$

$$P = \begin{cases} 2^{-\text{PSIST}(n)} & \text{if PSIST}(n) \neq 7 \\ 0 & \text{otherwise} \end{cases} \quad n = 10, 11, \dots, 15$$

where n is the overload class assigned to a MIN associated with the request.

The mobile station shall transmit the first probe in each access probe sequence at the power level specified in 6.1.2.3.1. The mobile station shall transmit each subsequent probe in the access probe sequence at a power level  $\text{PWR\_STEP}_s \times 0.5$  dB greater than that of the previous probe. Between access probes, the mobile station shall disable its transmitter.

<sup>22</sup>The P calculations for PSIST(n), n=0, 1, ... 9 imply taking the number 2 exponentiated by a floating point number. The entire process can be implemented using integer arithmetic. Since the random variable  $z_n$  in 6.6.7.2 ranges from 0 through  $2^{31} - 2$ , the persistence calculations can be implemented with sufficient accuracy in the range from 0 to  $2^{31}$ . The scaled probability value, P, can be written as:  $2^{31} \times 2^{-\lfloor \text{PSIST}(n)/4 \rfloor} \times 2^{-\lfloor \text{PSIST}(n)-4 \times \lfloor \text{PSIST}(n)/4 \rfloor \rfloor / 4}$ . The second factor can be implemented by shifting; the third factor consists of only four values that can be implemented by a table lookup.

After transmitting each probe, the mobile station shall wait  $TA = ACC\_TMO_S \times 80$  ms from the end of the Access Channel slot. If no acknowledgement is received within TA seconds, the mobile station shall perform the following:

- If  $NUM\_STEP_S$  or fewer access probes have been transmitted in this access probe sequence, the mobile station shall generate a random number, RT, from 0 to  $PROBE\_BKOFF + 1$ , using the procedure described in 6.6.7.2. The mobile station shall delay RT additional Access Channel slots, and then transmit the next access probe.
- Otherwise, if fewer than  $MAX\_REQ\_SEQ$  (for a request access) or  $MAX\_RSP\_SEQ$  (for a response access) access probe sequences have been transmitted in this access attempt, the mobile station shall begin the randomization procedures for another access probe sequence.
- Otherwise, the mobile station shall update its registration variables as specified in 6.6.5.6.3.2 and enter the *System Determination Substate* of the *Mobile Station Initialization State*.

#### 6.6.3.1.2 Acknowledgement Procedures

The acknowledgement procedures facilitate the reliable exchange of messages between the base station and the mobile station. The mobile station uses the fields ACK\_SEQ (acknowledgement sequence number), MSG\_SEQ (message sequence number), ACK\_REQ (acknowledgement required), and VALID\_ACK (valid acknowledgement) to support this mechanism. These fields are referred to as layer 2 fields, and the acknowledgement procedures are referred to as layer 2 procedures. All other message fields and the processing thereof are referred to as pertaining to layer 3. (See Appendix C for further discussion of layering.)

The mobile station shall set the ACK\_SEQ and VALID\_ACK fields of all messages sent on the Access Channel as specified in 6.6.2.1.2.

The mobile station shall generate a single set of MSG\_SEQ numbers for messages sent on the Access Channel. The mobile station shall set the MSG\_SEQ field of the first message sent on the Access Channel after powering on to 0. The mobile station shall increment MSG\_SEQ, modulo 4, for each new access attempt, even if the contents of the new message are identical to those of the previous message.

The mobile station shall monitor the Paging Channel while in the *System Access State*. When the mobile station receives a message with the VALID\_ACK field set to '1' and the ACK\_SEQ field set to the MSG\_SEQ number of the message currently being sent, the mobile station shall consider the current message to have been acknowledged and shall end the access attempt.

The mobile station shall not begin a new access attempt until the previous access attempt has ended.

#### 6.6.3.1.3 Registration

When an access attempt ends by the receipt of an acknowledgement from the base station, the mobile station shall update its registration variables as specified in 6.6.5.6.3.1.

#### 6.6.3.1.4 Handoffs

While in the *System Access State*, the mobile station should continue its pilot search (see 6.6.2.1.4.1), but shall not perform idle handoffs.

#### 6.6.3.2 Update Overhead Information Substate

In this substate, the mobile station monitors the Paging Channel until it has received the current configuration messages. The mobile station compares sequence numbers to determine whether all the configuration messages are up to date. To make sure it has the latest access parameters, the mobile station receives at least one message containing the ACC\_MSG\_SEQ field (except in case of a page response, since the initiating *Page Message* or *Slotted Page Message* contains ACC\_MSG\_SEQ), and waits, if necessary, for an *Access Parameters Message*.

Upon entering the *Update Overhead Information Substate*, the mobile station shall set the *System Access State* timer to a value of  $T_{41m}$  seconds. The mobile station shall set PAGED to NO. If the *Update Overhead Information Substate* was entered with a page response indication, the mobile station shall set CURR\_ACC\_MSG\_SEQ to ACC\_MSG\_SEQ<sub>s</sub>; otherwise, it shall set CURR\_ACC\_MSG\_SEQ to NULL.

If the state timer expires while in this substate, the mobile station shall enter the *System Determination Substate* of the *Mobile Station Initialization State*.

While in the *Update Overhead Information Substate*, the mobile station shall monitor the Paging Channel. If the mobile station declares a loss of the Paging Channel (see 6.4.3), it shall enter the *Mobile Station Idle State*. If the mobile station receives any of the following messages or orders that contain the mobile station's ESN, the mobile station shall process the message as follows:

1. *Local Control Order*: No requirements.
2. *Lock Order*: The mobile station shall record the reason for the *Lock Order* in the mobile station's semi-permanent memory (LCKRSN<sub>s-p</sub> = ORDQ<sub>r</sub>). The mobile station should notify the user of the locked condition. The mobile station shall enter the *System Determination Substate* of the *Mobile Station Initialization State*, and shall not enter the *System Access State* again until it has received an *Unlock Order*. This requirement shall take precedence over any other mobile station requirement specifying entry to the *System Access State*.
3. *Lock Until Power-Cycled Order*: The mobile station shall record the reason for the *Lock Until Power-Cycled Order* in the mobile station's semi-permanent memory (LCKRSN<sub>P-s-p</sub> = ORDQ<sub>r</sub>). The mobile station should notify the user of the locked condition. The mobile station shall enter the *System Determination Substate* of the *Mobile Station Initialization State*, and shall not enter the *System Access State* again until after the next mobile station power-up or until it has received an *Unlock*

1        *Order*. This requirement shall take precedence over any other mobile station  
2        requirement specifying entry to the *System Access State*.

3        If the mobile station receives any of the following messages, it shall process the message as  
4        follows:

- 5        1. *System Parameters Message*: The mobile station shall store the parameters from  
6        the message (see 6.6.2.2.1.1).
- 7        2. *Access Parameters Message*: The mobile station shall store the parameters from  
8        the message (see 6.6.2.2.2).
- 9        3. *Neighbor List Message*: The mobile station shall store the parameters from the  
10       message (see 6.6.2.2.3).
- 11       4. *CDMA Channel List Message*: The mobile station shall store the parameters from  
12       the message (see 6.6.2.2.4).
- 13       5. *Slotted Page Message*: The mobile station shall set CURR\_ACC\_MSG\_SEQ to  
14       ACC\_MSG\_SEQ<sub>r</sub>. If this substate was not entered with an origination or page  
15       response indication, the mobile station shall compare each of its active MINs with  
16       the MIN in each record of the message. If a match is declared (see 6.6.2.3), the  
17       mobile station shall set PAGED to YES.
- 18       6. *Page Message*: The mobile station shall set CURR\_ACC\_MSG\_SEQ to  
19       ACC\_MSG\_SEQ<sub>r</sub>. If this substate was not entered with an origination or page  
20       response indication, the mobile station shall compare each of its active MINs with  
21       the MIN in each record of the message. If a match is declared (see 6.6.2.3), the  
22       mobile station shall set PAGED to YES.
- 23       7. *Any other message or order*: The mobile station may ignore any other order or  
24       message.

25       When the stored configuration parameters are current (see 6.6.2.2) and  
26       CURR\_ACC\_MSG\_SEQ and ACC\_MSG\_SEQ<sub>s</sub> are equal and are not NULL, the mobile  
27       station shall disable the *System Access State* timer and do one of the following:

- 28       • If PAGED is equal to YES or if this substate was entered with a page response  
29       indication, the mobile station shall enter the *Page Response Substate*.
- 30       • If this substate was entered with an origination indication, the mobile station shall  
31       enter the *Mobile Station Origination Attempt Substate*.
- 32       • If this substate was entered with an order/message response indication, the mobile  
33       station shall enter the *Mobile Station Order/Message Response Substate*.
- 34       • If this substate was entered with a registration indication, the mobile station shall  
35       enter the *Registration Access Substate*.
- 36       • If this substate was entered with a message transmission indication, the mobile  
37       station shall enter the *Mobile Station Message Transmission Substate*.

### 6.6.3.3 Page Response Substate

In this substate, the mobile station sends a *Page Response Message* in response to a *Page Message* or *Slotted Page Message* from the base station. If the base station responds with an authentication request, the mobile station responds in this substate.

Upon entering the *Page Response Substate*, the mobile station shall send a *Page Response Message*, using the access procedures specified in 6.6.3.1.1.2.

While in this substate, the mobile station shall monitor the Paging Channel. If the mobile station declares a loss of the Paging Channel (see 6.4.3), it shall disable its transmitter and enter the *Mobile Station Idle State*. If the mobile station receives an acknowledgement to any message sent by the mobile station in this substate, the mobile station shall end the access attempt and update the registration variables as specified in 6.6.3.1.3. If the acknowledgement was not included in a *Channel Assignment Message*, *Authentication Challenge Message*, *Base Station Challenge Confirmation Order*, or *SSD Update Message*, the mobile station shall set the *System Access State* timer to  $T_{42m}$ .

If the *System Access State* timer expires while in this substate, the mobile station shall enter the *Mobile Station Idle State*.

If the mobile station receives any of the following messages and  $ESN_r$  matches the mobile station's ESN, then the mobile station shall process the message as described.

1. *Authentication Challenge Message*: If the mobile station receives this message while an access attempt is in progress, the mobile station shall ignore the message. If the mobile station receives this message after, or included in the same message as, the acknowledgement to any message sent by the mobile station in this substate, the mobile station shall disable the *System Access State* timer and respond to the message as specified in 6.3.12.1.5, using the access procedures specified in 6.6.3.1.1.2.
2. *Base Station Challenge Confirmation Order*: If the mobile station receives this message while an access attempt is in progress, the mobile station shall ignore the message. If the mobile station receives this message after, or included in the same message as, the acknowledgement to any message sent by the mobile station in this substate, the mobile station shall disable the *System Access State* timer and respond to the message as specified in 6.3.12.1.9, using the access procedures specified in 6.6.3.1.1.2.
3. *Channel Assignment Message*: The mobile station shall terminate any access attempt in progress. It shall then process the message as follows:  
  
If  $ASSIGN\_MODE_r$  equals '000', the mobile station shall store the Forward Traffic Channel code channel ( $CODE\_CHAN_s = CODE\_CHAN_r$ ), the frame offset ( $FRAME\_OFFSET_s = FRAME\_OFFSET_r$ ), the message encryption mode indicator ( $ENCRYPT\_MODE_s = ENCRYPT\_MODE_r$ ), and, if  $FREQ\_INCL_r$  equals '1', the frequency assignment ( $CDMACH_s = CDMA\_FREQ_r$ ), and then enter the *Traffic Channel Initialization Substate* of the *Mobile Station Control on the Traffic Channel State*.

If ASSIGN\_MODE<sub>R</sub> equals '001', the mobile station shall store the assigned Paging Channel (PAGECH<sub>S</sub> = CODE\_CHAN<sub>R</sub>). If FREQ\_INCL<sub>R</sub> equals '1', the mobile station shall store the frequency assignment (CDMACH<sub>S</sub> = CDMA\_FREQ<sub>R</sub>). The mobile station shall then enter the *Mobile Station Idle State*.

If ASSIGN\_MODE<sub>R</sub> equals '010' and RESPOND<sub>R</sub> equals '1', the mobile station shall enter the Initialization Task with a page response indication (see 2.6.1).

If ASSIGN\_MODE<sub>R</sub> equals '010' and RESPOND<sub>R</sub> equals '0', the mobile station shall enter the Initialization Task (see 2.6.1).

If ASSIGN\_MODE<sub>R</sub> equals '011', the mobile station shall store the system identification (SID<sub>S</sub> = SID<sub>R</sub>), voice mobile station attenuation code (VMAC<sub>S</sub> = VMAC<sub>R</sub>), voice channel number (ANALOG\_CHAN<sub>S</sub> = ANALOG\_CHAN<sub>R</sub>), SAT color code (SCC<sub>S</sub> = SCC<sub>R</sub>), and message encryption mode indicator (MEM<sub>S</sub> = MEM<sub>R</sub>) and enter the Confirm Initial Voice Channel Task (see 2.6.4.2) with a page response indication.

4. Local Control Order: No requirements.
5. Lock Order: The mobile station shall disable its transmitter and record the reason for the *Lock Order* in the mobile station's semi-permanent memory (LCKRSN<sub>S-p</sub> = ORDQ<sub>R</sub>). The mobile station should notify the user of the locked condition. The mobile station shall enter the *System Determination Substate* of the *Mobile Station Initialization State*, and shall not enter the *System Access State* again until it has received an *Unlock Order*. This requirement shall take precedence over any other mobile station requirement specifying entry to the *System Access State*.
6. Lock Until Power-Cycled Order: The mobile station shall disable its transmitter and record the reason for the *Lock Until Power-Cycled Order* in the mobile station's semi-permanent memory (LCKRSN<sub>P-S-p</sub> = ORDQ<sub>R</sub>). The mobile station should notify the user of the locked condition. The mobile station shall enter the *System Determination Substate* of the *Mobile Station Initialization State*, and shall not enter the *System Access State* again until after the next mobile station power-up or until it has received an *Unlock Order*. This requirement shall take precedence over any other mobile station requirement specifying entry to the *System Access State*.
7. Release Order: The mobile station shall enter the *Mobile Station Idle State* or the *System Determination Substate* of the *Mobile Station Initialization State*.
8. SSD Update Message: If the mobile station receives this message while an access attempt is in progress, the mobile station shall ignore the message. If the mobile station receives this message after, or included in the same message as, the acknowledgement to any message sent by the mobile station in this substate, the mobile station shall disable the *System Access State* timer and respond to the message as specified in 6.3.12.1.9, using the access procedures specified in 6.6.3.1.1.2.
9. Any other message or order: The mobile station may ignore any other order or message.

#### 6.6.3.4 Mobile Station Order/Message Response Substate

In this substate, the mobile station sends a message that is a response to a message received from the base station. If the base station responds with an authentication request, the mobile station responds in this substate.

Upon entering the *Mobile Station Order/Message Response Substate*, the mobile station shall send the response message using the access procedures specified in 6.6.3.1.1.2.

While in this substate, the mobile station shall monitor the Paging Channel. If the mobile station declares a loss of the Paging Channel (see 6.4.3), it shall enter the *Mobile Station Idle State*. If the mobile station receives an acknowledgement to any message sent by the mobile station in this substate, it shall end the access attempt and update the registration variables as specified in 6.6.3.1.3. If the acknowledgement was not included in an *Authentication Challenge Message*, *Base Station Challenge Confirmation Order*, or *SSD Update Message*, the mobile station shall enter the *Mobile Station Idle State*.

If the mobile station receives any of the following messages and  $ESN_r$  matches the mobile station's ESN, then the mobile station shall process the message as follows:

1. *Authentication Challenge Message*: If the mobile station receives this message while an access attempt is in progress, the mobile station shall ignore the message. If the mobile station receives this message included in the acknowledgement to any message sent by the mobile station in this substate, the mobile station shall respond to the message as specified in 6.3.12.1.5, using the access procedures specified in 6.6.3.1.1.2.
2. *Base Station Challenge Confirmation Order*: If the mobile station receives this message while an access attempt is in progress, the mobile station shall ignore the message. If the mobile station receives this message included in the acknowledgement to any message sent by the mobile station in this substate, the mobile station shall respond to the message as specified in 6.3.12.1.9, using the access procedures specified in 6.6.3.1.1.2.
3. *Local Control Order*: No requirements.
4. *Lock Order*: The mobile station shall disable its transmitter and record the reason for the *Lock Order* in the mobile station's semi-permanent memory ( $LCKRSN_{S-p} = ORDQ_r$ ). The mobile station should notify the user of the locked condition. The mobile station shall enter the *System Determination Substate* of the *Mobile Station Initialization State*, and shall not enter the *System Access State* again until it has received an *Unlock Order*. This requirement shall take precedence over any other mobile station requirement specifying entry to the *System Access State*.
5. *Lock Until Power-Cycled Order*: The mobile station shall disable its transmitter and record the reason for the *Lock Until Power-Cycled Order* in the mobile station's semi-permanent memory ( $LCKRSN_{S-p} = ORDQ_r$ ). The mobile station should notify the user of the locked condition. The mobile station shall enter the *System Determination Substate* of the *Mobile Station Initialization State*, and shall not enter the *System Access State* again until after the next mobile station power-up or until

it has received an *Unlock Order*. This requirement shall take precedence over any other mobile station requirement specifying entry to the *System Access State*.

6. *SSD Update Message*: If the mobile station receives this message while an access attempt is in progress, the mobile station shall ignore the message. If the mobile station receives this message included in the acknowledgement to any message sent by the mobile station in this substate, the mobile station shall respond to the message as specified in 6.3.12.1.9, using the access procedures specified in 6.6.3.1.1.2.

7. *Any other message or order*: The mobile station may ignore any other message or order.

#### 6.6.3.5 Mobile Station Origination Attempt Substate

In this substate, the mobile station sends an *Origination Message*. If the base station responds with an authentication request, the mobile station responds in this substate.

Upon entering the *Mobile Station Origination Attempt Substate*, the mobile station shall send the *Origination Message* using the access procedures specified in 6.6.3.1.1.2. The mobile station shall include in the *Origination Message* as many of the dialed digits as possible without exceeding the message capsule size.

While in this substate, the mobile station shall monitor the Paging Channel. If the mobile station declares a loss of the Paging Channel (see 6.4.3), it shall enter the *Mobile Station Idle State*. If the mobile station receives an acknowledgement to any message sent by the mobile station in this substate, it shall end the access attempt and update the registration variables as specified in 6.6.3.1.3. If the acknowledgement was not included in a *Channel Assignment Message*, *Authentication Challenge Message*, *Base Station Challenge Confirmation Order*, or *SSD Update Message*, the mobile station shall set the *System Access State* timer to T<sub>42m</sub>.

If the *System Access State* timer expires while in this substate, the mobile station shall enter the *Mobile Station Idle State*.

If the mobile station is directed by the user to disconnect the call, the mobile station shall abort any access attempt in progress and enter the *System Determination Substate* of the *Mobile Station Initialization State*.

If the mobile station receives any of the following messages and ESN<sub>r</sub> matches the mobile station's ESN, then the mobile station shall process the message as follows:

1. *Authentication Challenge Message*: If the mobile station receives this message while an access attempt is in progress, the mobile station shall ignore the message. If the mobile station receives this message after, or included in the same message as, the acknowledgement to any message sent by the mobile station in this substate, the mobile station shall disable the *System Access State* timer and respond to the message as specified in 6.3.12.1.5, using the access procedures specified in 6.6.3.1.1.2.
2. *Base Station Challenge Confirmation Order*: If the mobile station receives this message while an access attempt is in progress, the mobile station shall ignore the



message. If the mobile station receives this message after, or included in the same message as, the acknowledgement to any message sent by the mobile station in this substate, the mobile station shall disable the *System Access State* timer and respond to the message as specified in 6.3.12.1.9, using the access procedures specified in 6.6.3.1.1.2.

3. *Channel Assignment Message*: The mobile station shall terminate any access attempt in progress. It shall then process the message as follows:

If ASSIGN\_MODE<sub>r</sub> equals '000', the mobile station shall store the Forward Traffic Channel code channel (CODE\_CHAN<sub>s</sub> = CODE\_CHAN<sub>r</sub>), the frame offset (FRAME\_OFFSET<sub>s</sub> = FRAME\_OFFSET<sub>r</sub>), the message encryption mode indicator (ENCRYPT\_MODE<sub>s</sub> = ENCRYPT\_MODE<sub>r</sub>), and, if FREQ\_INCL<sub>r</sub> equals '1', the frequency assignment (CDMACH<sub>s</sub> = CDMA\_FREQ<sub>r</sub>), and then enter the *Traffic Channel Initialization Substate* of the *Mobile Station Control on the Traffic Channel State*.

If ASSIGN\_MODE<sub>r</sub> equals '001', the mobile station shall store the assigned Paging Channel (PAGECH<sub>s</sub> = CODE\_CHAN<sub>r</sub>). If FREQ\_INCL<sub>r</sub> equals '1', the mobile station shall store the frequency assignment (CDMACH<sub>s</sub> = CDMA\_FREQ<sub>r</sub>). The mobile station shall then enter the *Mobile Station Idle State*.

If ASSIGN\_MODE<sub>r</sub> equals '010' and RESPOND<sub>r</sub> equals '1', the mobile station shall enter the Initialization Task with a page response indication (see 2.6.1).

If ASSIGN\_MODE<sub>r</sub> equals '010' and RESPOND<sub>r</sub> equals '0', the mobile station shall enter the Initialization Task (see 2.6.1).

If ASSIGN\_MODE<sub>r</sub> equals '011', the mobile station shall store the system identification (SID<sub>s</sub> = SID<sub>r</sub>), voice mobile station attenuation code (VMAC<sub>s</sub> = VMAC<sub>r</sub>), voice channel number (ANALOG\_CHAN<sub>s</sub> = ANALOG\_CHAN<sub>r</sub>), SAT color code (SCC<sub>s</sub> = SCC<sub>r</sub>), and message encryption mode indicator (MEM<sub>s</sub> = MEM<sub>r</sub>) and enter the Confirm Initial Voice Channel Task (see 2.6.4.2) with a page response indication.

4. *Intercept Order*: The mobile station shall terminate any access attempt in progress and enter the *Mobile Station Idle State*.

5. *Local Control Order*: No requirements.

6. *Lock Order*: The mobile station shall disable its transmitter and record the reason for the *Lock Order* in the mobile station's semi-permanent memory (LCKRSN<sub>s-p</sub> = ORDQ<sub>r</sub>). The mobile station should notify the user of the locked condition. The mobile station shall enter the *System Determination Substate* of the *Mobile Station Initialization State*, and shall not enter the *System Access State* again until it has received an *Unlock Order*. This requirement shall take precedence over any other mobile station requirement specifying entry to the *System Access State*.

7. *Lock Until Power-Cycled Order*: The mobile station shall disable its transmitter and record the reason for the *Lock Until Power-Cycled Order* in the mobile station's semi-permanent memory (LCKRSN\_P<sub>s-p</sub> = ORDQ<sub>r</sub>). The mobile station should notify the user of the locked condition. The mobile station shall enter the *System*

*Determination Substate of the Mobile Station Initialization State*, and shall not enter the *System Access State* again until after the next mobile station power-up or until it has received an *Unlock Order*. This requirement shall take precedence over any other mobile station requirement specifying entry to the *System Access State*.

8. *Release Order*: The mobile station shall enter the *Mobile Station Idle State* or the *System Determination Substate of the Mobile Station Initialization State*.
9. *Reorder Order*: The mobile station shall terminate any access attempt in progress and enter the *Mobile Station Idle State*.
10. *SSD Update Message*: If the mobile station receives this message while an access attempt is in progress, the mobile station shall ignore the message. If the mobile station receives this message after, or included in the same message as, the acknowledgement to any message sent by the mobile station in this substate, the mobile station shall disable the *System Access State* timer and respond to the message as specified in 6.3.12.1.9, using the access procedures specified in 6.6.3.1.1.2.
11. *Any other message or order*: The mobile station may ignore any other message or order.

#### 6.6.3.6 Registration Access Substate

In this substate, the mobile station sends an *Initial Registration Message*, a sequence of one or more *Registration Update Messages*, or both. If the base station responds with an authentication request, the mobile station responds in this substate.

Upon entering the *Registration Access Substate*, the mobile station shall send the first registration message, using the access procedures specified in 6.6.3.1.1.2.

While in this substate, the mobile station shall monitor the Paging Channel. If the mobile station declares a loss of the Paging Channel (see 6.4.3), it shall enter the *Mobile Station Idle State*. If the mobile station receives an acknowledgement to any message sent by the mobile station in this substate, it shall end the access attempt and update the registration variables as specified in 6.6.3.1.3. If the acknowledgement was not included in an *Authentication Challenge Message*, *Base Station Challenge Confirmation Order*, *SSD Update Message*, or *Release Order*, or if the registration access was initiated due to a user direction to power down, the mobile station shall do one of the following:

- If there are further registration messages to be sent, the mobile station shall send the next registration message using the access procedures specified in 6.6.3.1.1.2.
- Otherwise, if the registration access was initiated due to a user direction to power down, the mobile station shall update registration variables as specified in 6.6.5.6.3.3 and may power down.
- Otherwise, the mobile station shall enter the *Mobile Station Idle State*.

If the mobile station is directed by the user to originate a call, the mobile station may abort any access attempt in progress and enter the *Mobile Station Origination Attempt Substate*.

1 If the mobile station receives a *Page Message* or a *Slotted Page Message*, the mobile station  
2 may compare each of its active MINs with the MIN in each record of the message. If a  
3 match is declared (see 6.6.2.3), the mobile station shall abort any access attempt in  
4 progress and enter the *Page Response Substate*.

5 If the mobile station receives any of the following messages and  $ESN_r$  matches the mobile  
6 station's ESN, then the mobile station shall process the message as described.

- 7 1. *Added MIN Rejected Order*: No requirements.
- 8 2. *Authentication Challenge Message*: If the mobile station receives this message while  
9 an access attempt is in progress, or if the registration access was initiated due to a  
10 user direction to power down, the mobile station shall ignore the message. If the  
11 mobile station receives this message after, or included in, the acknowledgement to  
12 any message sent by the mobile station in this substate, the mobile station shall  
13 respond to the message as specified in 6.3.12.1.5, using the access procedures  
14 specified in 6.6.3.1.1.2.
- 15 3. *Base Station Challenge Confirmation Order*: If the mobile station receives this  
16 message while an access attempt is in progress, or if the registration access was  
17 initiated due to a user direction to power down, the mobile station shall ignore the  
18 message. If the mobile station receives this message after, or included in, the  
19 acknowledgement to its *Page Response Message*, the mobile station shall respond  
20 to the message as specified in 6.3.12.1.9, using the access procedures specified in  
21 6.6.3.1.1.2.
- 22 4. *Local Control Order*: No requirements.
- 23 5. *Lock Order*: The mobile station shall disable its transmitter and record the reason  
24 for the *Lock Order* in the mobile station's semi-permanent memory  
25 ( $LCKRSN_{S-p} = ORDQ_r$ ). The mobile station should notify the user of the locked  
26 condition. The mobile station shall enter the *System Determination Substate* of the  
27 *Mobile Station Initialization State*, and shall not enter the *System Access State* again  
28 until it has received an *Unlock Order*. This requirement shall take precedence over  
29 any other mobile station requirement specifying entry to the *System Access State*.
- 30 6. *Lock Until Power-Cycled Order*: The mobile station shall disable its transmitter and  
31 record the reason for the *Lock Until Power-Cycled Order* in the mobile station's  
32 semi-permanent memory ( $LCKRSN_{S-p} = ORDQ_r$ ). The mobile station should  
33 notify the user of the locked condition. The mobile station shall enter the *System*  
34 *Determination Substate* of the *Mobile Station Initialization State*, and shall not enter  
35 the *System Access State* again until after the next mobile station power-up or until  
36 it has received an *Unlock Order*. This requirement shall take precedence over any  
37 other mobile station requirement specifying entry to the *System Access State*.
- 38 7. *Registration Accepted Order*: No requirements.
- 39 8. *Registration Rejected Order*: No requirements.
- 40 9. *Release Order*: The mobile station shall enter the *Mobile Station Idle State* or the  
41 *System Determination Substate* of the *Mobile Station Initialization State*.

10. SSD Update Message: If the mobile station receives this message while an access attempt is in progress, or if the registration access was initiated due to a user direction to power down, the mobile station shall ignore the message. If the mobile station receives this message after, or included in, the acknowledgement to its *Page Response Message*, the mobile station shall respond to the message as specified in 6.3.12.1.9, using the access procedures specified in 6.6.3.1.1.2.

11. Any other message or order: The mobile station may ignore any other message or order.

#### 6.6.3.7 Mobile Station Message Transmission Substate

In this substate, the mobile station sends a *Data Burst Message*. If the base station responds with an authentication request, the mobile station responds in this substate.

Support of this substate is optional.

Upon entering the *Mobile Station Message Transmission Substate*, the mobile station shall transmit the *Data Burst Message* using the access procedures specified in 6.6.3.1.1.2.

While in this substate, the mobile station shall monitor the Paging Channel. If the mobile station declares a loss of the Paging Channel (see 6.4.3), it shall enter the *Mobile Station Idle State*. If the mobile station receives an acknowledgement to any message sent by the mobile station in this substate, it shall end the access attempt and update the registration variables as specified in 6.6.3.1.3. If the acknowledgement was not included in an *Authentication Challenge Message*, *Base Station Challenge Confirmation Order*, or *SSD Update Message*, the mobile station shall enter the *Mobile Station Idle State*.

If the mobile station receives a *Page Message* or a *Slotted Page Message*, the mobile station may compare each of its active MINs with the MIN in each record of the message. If a match is declared (see 6.6.2.3), the mobile station shall abort any access attempt in progress and enter the *Page Response Substate*. The mobile station may store the message for later transmission.

If the mobile station receives any of the following messages and  $ESN_r$  matches the mobile station's  $ESN$ , then the mobile station shall process the message as described.

1. Authentication Challenge Message: If the mobile station receives this message while an access attempt is in progress, the mobile station shall ignore the message. If the mobile station receives this message included in the acknowledgement to any message sent by the mobile station in this substate, the mobile station shall respond to the message as specified in 6.3.12.1.5, using the access procedures specified in 6.6.3.1.1.2.

2. Base Station Challenge Confirmation Order: If the mobile station receives this message while an access attempt is in progress, the mobile station shall ignore the message. If the mobile station receives this message included in the acknowledgement to any message sent by the mobile station in this substate, the mobile station shall respond to the message as specified in 6.3.12.1.9, using the access procedures specified in 6.6.3.1.1.2.

3. Local Control Order: No requirements.

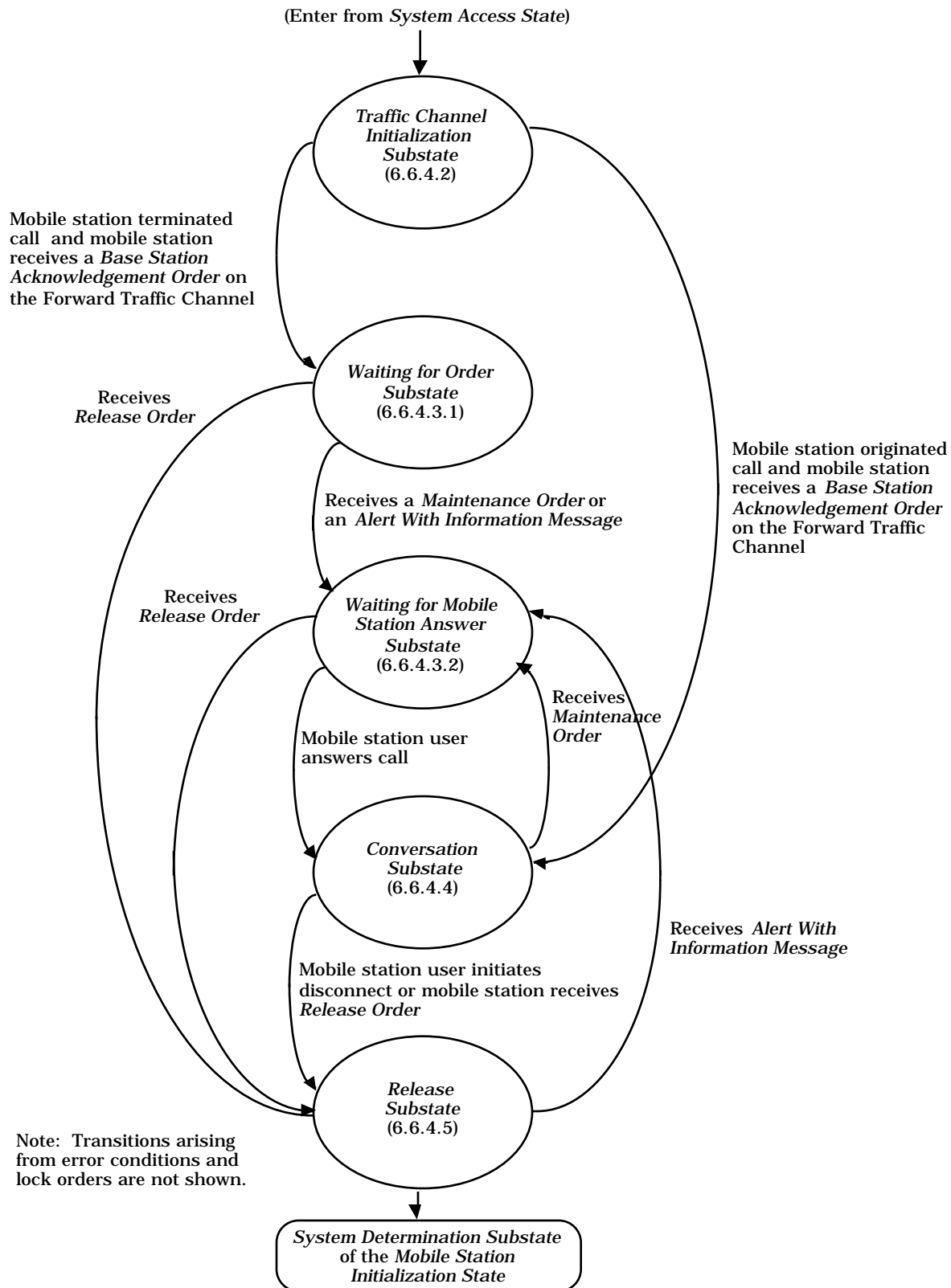
- 1       4. Lock Order: The mobile station shall disable its transmitter and record the reason  
2       for the *Lock Order* in the mobile station's semi-permanent memory  
3       (LCKRSN<sub>S-p</sub> = ORDQ<sub>R</sub>). The mobile station should notify the user of the locked  
4       condition. The mobile station shall enter the *System Determination Substate* of the  
5       *Mobile Station Initialization State*, and shall not enter the *System Access State* again  
6       until it has received an *Unlock Order*. This requirement shall take precedence over  
7       any other mobile station requirement specifying entry to the *System Access State*.
- 8       5. Lock Until Power-Cycled Order: The mobile station shall disable its transmitter and  
9       record the reason for the *Lock Until Power-Cycled Order* in the mobile station's  
10      semi-permanent memory (LCKRSN<sub>P-s-p</sub> = ORDQ<sub>R</sub>). The mobile station should  
11      notify the user of the locked condition. The mobile station shall enter the *System*  
12      *Determination Substate* of the *Mobile Station Initialization State*, and shall not enter  
13      the *System Access State* again until after the next mobile station power-up or until  
14      it has received an *Unlock Order*. This requirement shall take precedence over any  
15      other mobile station requirement specifying entry to the *System Access State*.
- 16      6. Data Burst Message: No requirements.
- 17      7. SSD Update Message: If the mobile station receives this message while an access  
18      attempt is in progress, the mobile station shall ignore the message. If the mobile  
19      station receives this message included in the acknowledgement to any message  
20      sent by the mobile station in this substate, the mobile station shall respond to the  
21      message as specified in 6.3.12.1.9, using the access procedures specified in  
22      6.6.3.1.1.2.
- 23      8. Any other message or order: The mobile station may ignore any other message or  
24      order.

#### 25   6.6.4 Mobile Station Control on the Traffic Channel State

26   In this state, the mobile station communicates with the base station using the Forward and  
27   Reverse Traffic Channels.

28   As illustrated in Figure 6.6.4-1, the *Mobile Station Control on the Traffic Channel State*  
29   consists of the following substates:

- 30      • *Traffic Channel Initialization Substate* - In this substate, the mobile station verifies  
31      that it can receive the Forward Traffic Channel and begins transmitting on the  
32      Reverse Traffic Channel.
- 33      • *Waiting for Order Substate* - In this substate, the mobile station waits for an *Alert*  
34      *With Information Message*.
- 35      • *Waiting for Mobile Station Answer Substate* - In this substate, the mobile station waits  
36      for the user to answer the call.
- 37      • *Conversation Substate* - In this substate, the mobile station's primary service option  
38      application exchanges primary traffic packets with the base station.
- 39      • *Release Substate* - In this substate, the mobile station disconnects the call.



**Figure 6.6.4-1. Mobile Station Control on the Traffic Channel State**

#### 6.6.4.1 Special Functions and Actions

The mobile station performs the following special functions and actions in one or more of the substates of the *Mobile Station Control on the Traffic Channel State*.

##### 6.6.4.1.1 Forward Traffic Channel Power Control

To support Forward Traffic Channel power control, the mobile station reports frame error rate statistics to the base station. If the base station enables periodic reporting, the mobile station reports frame error rate statistics at specified intervals. If the base station enables threshold reporting, the mobile station reports frame error rate statistics when the frame error rate reaches a specified threshold.

The mobile station shall maintain a counter (TOT\_FRAMES<sub>S</sub>) for the total number of received frames and a counter (BAD\_FRAMES<sub>S</sub>) for the number of received bad frames (see 6.2.2.2).

The mobile station shall perform the following for each received frame:

- The mobile station shall increment TOT\_FRAMES<sub>S</sub> by 1.
- If the received frame is bad, the mobile station shall increment BAD\_FRAMES<sub>S</sub> by 1.
- If PWR\_REP\_THRESH<sub>S</sub> is not zero and BAD\_FRAMES<sub>S</sub> is equal to PWR\_REP\_THRESH<sub>S</sub>, the mobile station shall send a *Power Measurement Report Message* and set TOT\_FRAMES<sub>S</sub> and BAD\_FRAMES<sub>S</sub> to zero. After sending the message, the mobile station shall not increment either counter for a period of PWR\_REP\_DELAY<sub>S</sub> × 4 frames.
- If PWR\_REP\_MODE<sub>S</sub> is equal to '0' and TOT\_FRAMES<sub>S</sub> is equal to  $\lfloor (2^{(\text{PWR\_REP\_FRAMES}_S/2)} \times 5) \rfloor$ , the mobile station shall set TOT\_FRAMES<sub>S</sub> and BAD\_FRAMES<sub>S</sub> to zero.
- If PWR\_REP\_MODE<sub>S</sub> is equal to '1' and TOT\_FRAMES<sub>S</sub> is equal to  $\lfloor (2^{(\text{PWR\_REP\_FRAMES}_S/2)} \times 5) \rfloor$ , the mobile station shall send a *Power Measurement Report Message* and set TOT\_FRAMES<sub>S</sub> and BAD\_FRAMES<sub>S</sub> to zero.

##### 6.6.4.1.1.1 Forward Traffic Channel Power Control Initialization

To initialize Forward Traffic Channel power control, the mobile station shall set TOT\_FRAMES<sub>S</sub> and BAD\_FRAMES<sub>S</sub> to zero.

##### 6.6.4.1.1.2 Processing the Power Control Parameters Message

The mobile station shall store the following parameters from the *Power Control Parameters Message*:

- Power control reporting threshold (PWR\_REP\_THRESH<sub>S</sub> = PWR\_REP\_THRESH<sub>T</sub>)
- Power control reporting frame count (PWR\_REP\_FRAMES<sub>S</sub> = PWR\_REP\_FRAMES<sub>T</sub>)
- Power report mode indicator (PWR\_REP\_MODE<sub>S</sub> = PWR\_REP\_MODE<sub>T</sub>)
- Power report delay (PWR\_REP\_DELAY<sub>S</sub> = PWR\_REP\_DELAY<sub>T</sub>)

1 The mobile station shall set TOT\_FRAMES<sub>S</sub> and BAD\_FRAMES<sub>S</sub> to zero.

## 2 6.6.4.1.2 Service Options

### 3 6.6.4.1.2.1 Overview

4 While operating on the Traffic Channel, the mobile station and base station can use the  
5 default service option, Service Option 1, or request an alternative service option. The  
6 mobile station can request an alternative service option at the time of call origination or  
7 during operation on the Traffic Channel. If the service option request is acceptable to the  
8 base station, the mobile station and the base station begin using the new service option.

9 If the mobile station requests a service option that is not acceptable to the base station, the  
10 base station can reject the requested service option or request an alternative service option.  
11 If the base station requests an alternative service option, the mobile station can accept or  
12 reject the base station's alternative service option, or request another service option. This  
13 process, called service option negotiation, ends when the mobile station and base station  
14 find a mutually acceptable service option, or when the mobile station rejects a service  
15 option request from the base station or the base station rejects a service option request  
16 from the mobile station.

17 The mobile station and base station use the *Service Option Request Order* to request a  
18 service option, and *Service Option Response Order* to accept or reject a service option  
19 request. In addition, the mobile station can request a service option in the *Origination*  
20 *Message*.

21 The mobile station uses a variable (SO\_REQ<sub>S</sub>) to record the number of the service option for  
22 which the mobile station has sent a *Service Option Request Order* and is expecting a *Service*  
23 *Option Response Order*. SO\_REQ<sub>S</sub> is set to a special value NULL when the mobile station is  
24 not expecting a *Service Option Response Order*.

### 25 6.6.4.1.2.2 Requirements

#### 26 6.6.4.1.2.2.1 Processing the *Service Option Request Order*

27 When the mobile station receives a *Service Option Request Order*, it shall perform the  
28 following:

- 29 • If the mobile station supports and accepts the requested service option, the mobile  
30 station shall set SO\_REQ<sub>S</sub> to NULL and send a *Service Option Response Order*  
31 accepting the requested service option within the time limit required by the requested  
32 service option. The mobile station shall begin using the requested service option in  
33 accordance with the requirements for the requested service option.
- 34 • If the mobile station supports the requested service option and has an alternative  
35 service option to request, the mobile station shall set SO\_REQ<sub>S</sub> to the alternative  
36 service option number and send a *Service Option Request Order* requesting the  
37 alternative service option within the time limit required by the service option specified  
38 in the received order.



- 1       • If the mobile station supports the requested service option, does not accept the  
2       requested service option, and does not have an alternative service option to request,  
3       the mobile station shall set SO\_REQ<sub>s</sub> to NULL and send a *Service Option Response*  
4       *Order* to reject the request within the time limit required by the requested service  
5       option.
- 6       • If the mobile station does not support the requested service option and has an  
7       alternative service option to request, the mobile station shall set SO\_REQ<sub>s</sub> to the  
8       alternative service option number and send a *Service Option Request Order* to request  
9       the alternative service option within T<sub>56m</sub> seconds.
- 10      • If the mobile station does not support the requested service option and does not have  
11      an alternative service option to request, the mobile station shall set SO\_REQ<sub>s</sub> to  
12      NULL and send a *Service Option Response Order* to reject the request within T<sub>56m</sub>  
13      seconds.

#### 14   6.6.4.1.2.2 Processing the *Service Option Response Order*

15   When the mobile station receives a *Service Option Response Order*, it shall perform the  
16   following:

- 17      • If the service option number specified in the order is equal to SO\_REQ<sub>s</sub>, the mobile  
18      station shall set SO\_REQ<sub>s</sub> to NULL and begin using the specified service option in  
19      accordance with the requirements for the service option.
- 20      • If the order indicates a service option rejection, the mobile station shall set SO\_REQ<sub>s</sub>  
21      to NULL.
- 22      • If the order does not indicate a service option rejection and the service option  
23      specified in the order is not equal to SO\_REQ<sub>s</sub>, the mobile station shall set SO\_REQ<sub>s</sub>  
24      to NULL and send a *Mobile Station Reject Order* (ORDQ = '00000100') within T<sub>56m</sub>  
25      seconds.

#### 26   6.6.4.1.2.3 Service Option Request Initialization

27   The mobile station shall set SO\_REQ<sub>s</sub> to the selected service option number.

#### 28   6.6.4.1.3 Acknowledgement Procedures

29   The acknowledgement procedures facilitate the reliable exchange of messages between the  
30   base station and the mobile station. The mobile station uses the fields ACK\_SEQ  
31   (acknowledgement sequence number), MSG\_SEQ (message sequence number) and  
32   ACK\_REQ (acknowledgement required indicator) to detect duplicate messages and provide a  
33   reference for acknowledgements. These message fields are referred to as layer 2 fields, and  
34   the acknowledgement procedures are referred to as layer 2 procedures. All other message  
35   fields are referred to as layer 3 fields, and the processing of layer 3 fields is referred to as  
36   layer 3 processing. (See Appendix C for further discussion of layering.)

37   On both the Forward Traffic Channel and the Reverse Traffic Channel, the procedure for  
38   messages requiring acknowledgement is a selective repeat scheme in which a message is  
39   retransmitted only if an acknowledgement for it is not received.

#### 6.6.4.1.3.1 Messages Requiring Acknowledgement

A Traffic Channel message requires acknowledgement when the ACK\_REQ field is set to '1'.

##### 6.6.4.1.3.1.1 Transmitting a Message and Receiving an Acknowledgement

If the mobile station requires that the base station receive one message before another message, the mobile station shall wait for an acknowledgement to the first message before transmitting the second. Otherwise, the mobile station may transmit up to four different messages requiring acknowledgement before receiving an acknowledgement for the first message.

The mobile station shall store the next message sequence number to be transmitted for messages requiring acknowledgement (MSG\_SEQ\_ACK<sub>S</sub>). The mobile station shall store an acknowledgement status indicator (ACK\_WAITING<sub>S</sub>[n], where n is 0 through 7) for each possible value of the Reverse Traffic Channel message MSG\_SEQ field. The mobile station shall not send a new message requiring acknowledgement when ACK\_WAITING<sub>S</sub>[(MSG\_SEQ\_ACK<sub>S</sub> + 4) mod 8] is equal to YES.

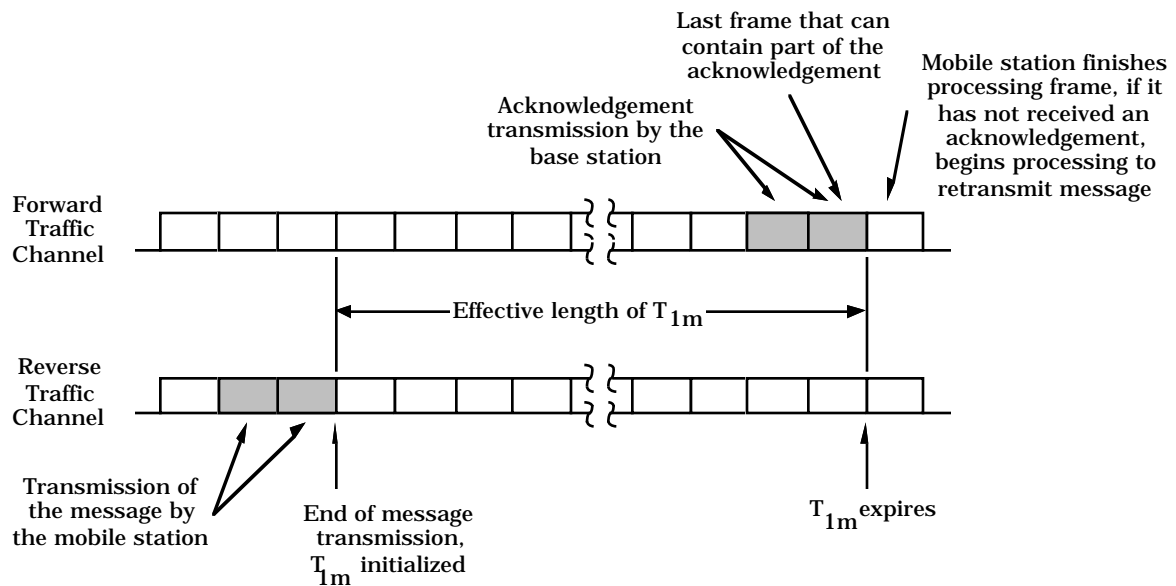
The mobile station shall perform the following procedures:

- When the mobile station receives any message on the Forward Traffic Channel, it shall set ACK\_WAITING<sub>S</sub>[ACK\_SEQ<sub>r</sub>] to NO.
- When the mobile station sends a new message requiring acknowledgement on the Reverse Traffic Channel, it shall set ACK\_WAITING<sub>S</sub>[MSG\_SEQ\_ACK<sub>S</sub>] to YES and shall set the MSG\_SEQ field of the message to MSG\_SEQ\_ACK<sub>S</sub>. The mobile station shall then increment MSG\_SEQ\_ACK<sub>S</sub>, modulo 8.

The mobile station shall not retransmit a message for which it has received an acknowledgement.

If the mobile station has not received an acknowledgement within T<sub>1m</sub> seconds after transmitting the message, the mobile station shall retransmit the message (see Figure 6.6.4.1.3.1.1-1). If the mobile station retransmits a message, the mobile station shall use the same MSG\_SEQ number for the retransmission. The mobile station shall not retransmit a message sooner than T<sub>1m</sub> seconds after the previous transmission.

The mobile station shall store a retransmission counter (RETRY\_COUNT<sub>S</sub>) for each transmitted message requiring acknowledgement. The mobile station shall set RETRY\_COUNT<sub>S</sub> to zero prior to the first transmission of the message. After each transmission of the message, the mobile station shall increment RETRY\_COUNT<sub>S</sub> if no acknowledgement is received. When RETRY\_COUNT<sub>S</sub> is equal to N<sub>1m</sub>, the mobile station shall declare an acknowledgement failure.



**Figure 6.6.4.1.3.1.1-1. Time Limit for Acknowledgement**

#### 6.6.4.1.3.1.2 Receiving a Message and Returning an Acknowledgement

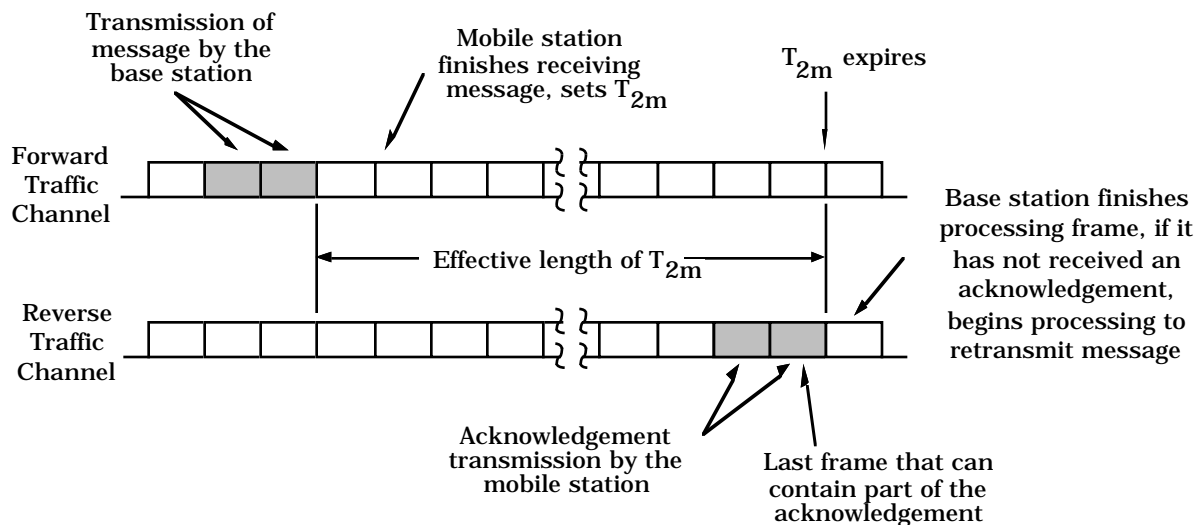
Messages received on the Forward Traffic Channel contain MSG\_SEQ fields that are incremented by the same rules as messages transmitted on the Reverse Traffic Channel. Separate sequence numbers are maintained for Forward Traffic Channel Messages that require acknowledgement and for messages that do not require acknowledgement.

The mobile station acknowledges a received message by transmitting a message with the ACK\_SEQ field set equal to the MSG\_SEQ field of the received message. A message transmitted with the ACK\_SEQ field set in this manner is referred to as including an acknowledgement of the received message.

Whenever a message requiring acknowledgement is received, the mobile station shall set the ACK\_SEQ field of subsequent Reverse Traffic Channel messages to MSG\_SEQ<sub>r</sub>.

After receiving a message requiring acknowledgement, the mobile station shall transmit a message including an acknowledgement within  $T_{2m}$  seconds as shown in Figure 6.6.4.1.3.1.2-1.

When a received message requires acknowledgement and no message is available within  $T_{2m}$  seconds after the message is received, the mobile station shall transmit a *Mobile Station Acknowledgement Order* including the acknowledgement. The *Mobile Station Acknowledgement Order* shall be sent as a message not requiring acknowledgement.



**Figure 6.6.4.1.3.1.2-1. Time Limit for Acknowledgement**

For duplicate message detection, the mobile station shall store a received status indicator for each possible value of the Forward Traffic Channel message MSG\_SEQ field (MSG\_SEQ\_RCVD<sub>s</sub>[n], where n is 0 through 7). The mobile station shall perform the following procedures:

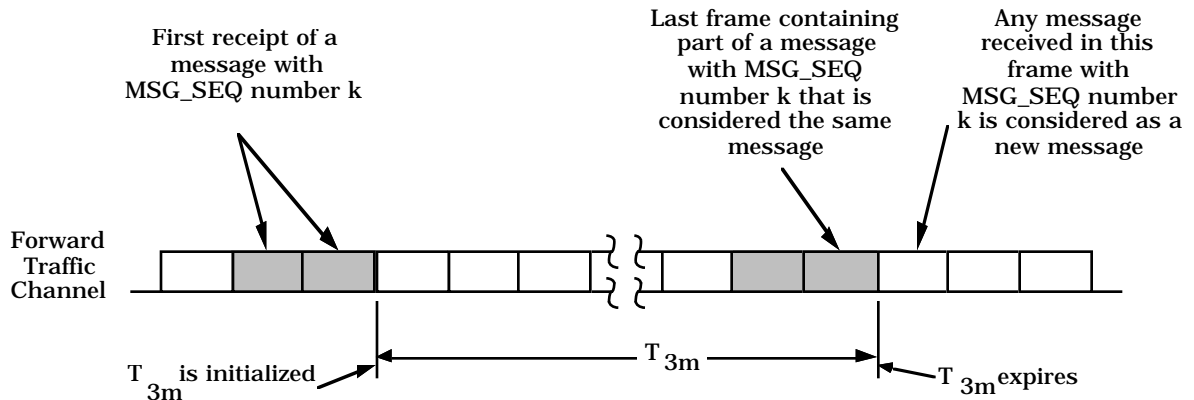
- When a message requiring acknowledgement is received and MSG\_SEQ\_RCVD<sub>s</sub>[MSG\_SEQ<sub>r</sub>] is equal to NO, the mobile station shall process the message as a new message. The mobile station shall then set MSG\_SEQ\_RCVD<sub>s</sub>[MSG\_SEQ<sub>r</sub>] to YES, and shall set MSG\_SEQ\_RCVD<sub>s</sub>[(MSG\_SEQ<sub>r</sub> + 4) mod 8] to NO.
- When a message requiring acknowledgement is received and MSG\_SEQ\_RCVD<sub>s</sub>[MSG\_SEQ<sub>r</sub>] is equal to YES, the mobile station shall acknowledge the message but shall not perform any further processing of the message.

#### 6.6.4.1.3.2 Messages Not Requiring Acknowledgement

A Traffic Channel message does not require acknowledgement when the ACK\_REQ field is set to '0'.

The mobile station shall store the next message sequence number to be transmitted for messages not requiring acknowledgement (MSG\_SEQ\_NOACK<sub>s</sub>). For each new message sent that does not require acknowledgement, the mobile station shall set the MSG\_SEQ field of the message to MSG\_SEQ\_NOACK<sub>s</sub> and shall then increment MSG\_SEQ\_NOACK<sub>s</sub>, modulo 8.

The mobile station shall consider all messages received within  $T_{3m}$  seconds that do not require acknowledgement and have the same MSG\_SEQ number to be duplicates, as shown in Figure 6.6.4.1.3.2-1. If the mobile station receives multiple copies of a message as determined by the MSG\_SEQ number, it shall discard the duplicate copies.



**Figure 6.6.4.1.3.2-1. Time Window for Detecting Duplicate Messages not Requiring Acknowledgement**

#### 6.6.4.1.3.3 Acknowledgement Procedures Reset

The mobile station shall reset the acknowledgement procedures as follows:

- Message sequence number reset. The mobile station shall set MSG\_SEQ\_ACK<sub>s</sub> to 0, MSG\_SEQ\_NOACK<sub>s</sub> to 0, and shall set ACK\_WAITING<sub>s</sub>[n] to NO for all values of n from 0 to 7.
- Retransmission counter reset. The mobile station shall set the retransmission counter (RETRY\_COUNT<sub>s</sub>) to zero.
- Acknowledgement sequence number reset. The mobile station shall set the ACK\_SEQ field of all Reverse Traffic Channel messages to 7 until the first message requiring acknowledgement is received.
- Duplicate detection reset. The mobile station shall set MSG\_SEQ\_RCVD<sub>s</sub>[n] to NO for all values of n from 0 to 7.

#### 6.6.4.1.4 Processing the *In-Traffic System Parameters Message*

The mobile station shall store the following parameters from the *In-Traffic System Parameters Message*:

- System identification (SID<sub>s</sub> = SID<sub>r</sub>)
- Network identification (NID<sub>s</sub> = NID<sub>r</sub>)
- Search window size for the Active Set and the Candidate Set (SRCH\_WIN\_A<sub>s</sub> = SRCH\_WIN\_A<sub>r</sub>)
- Search window size for the Neighbor Set (SRCH\_WIN\_N<sub>s</sub> = SRCH\_WIN\_N<sub>r</sub>)
- Search window size for the Remaining Set (SRCH\_WIN\_R<sub>s</sub> = SRCH\_WIN\_R<sub>r</sub>)
- Pilot detection threshold (T\_ADD<sub>s</sub> = T\_ADD<sub>r</sub>)
- Pilot drop threshold T\_DROP<sub>s</sub> = T\_DROP<sub>r</sub>)

- Active Set versus Candidate Set comparison threshold ( $T_{COMP_S} = T_{COMP_T}$ )
- Drop timer value ( $T_{TDROP_S} = T_{TDROP_T}$ )
- Maximum age for retention of Neighbor Set members  
( $NGHBR\_MAX\_AGE_S = NGHBR\_MAX\_AGE_T$ )

#### 6.6.4.1.5 Message Action Times

A message without a `USE_TIME` field or with a `USE_TIME` field set to '0' has an implicit action time. A message whose `USE_TIME` field is set to '1' has an explicit action time which is specified in the `ACTION_TIME` field of the message. A message with a future action time is called a pending message.

Unless otherwise specified, a message having an implicit action time shall take effect as soon as it is processed, and a message with an explicit action time shall take effect when System Time (in 80 ms units) modulo 64 becomes equal to the message's `ACTION_TIME`.

The mobile station shall support one pending message at any given time, not including pending *Service Option Control Orders*. The number of pending *Service Option Control Orders* that the mobile station is required to support is specific to the service option (see Appendix A).

#### 6.6.4.2 Traffic Channel Initialization Substate

In this substate, the mobile station verifies that it can receive the Forward Traffic Channel and begins transmitting on the Reverse Traffic Channel.

Upon entering the *Traffic Channel Initialization Substate*, the mobile station shall perform the following:

- The mobile station shall perform registration initialization as specified in 6.6.5.6.4.1.
- The mobile station shall reset the acknowledgement procedures as specified in 6.6.4.1.3.3.
- The mobile station shall initialize Forward Traffic Channel power control as specified in 6.6.4.1.1.1.
- If the *Origination Message* requests a special service option, the mobile station shall perform service option request initialization as specified in 6.6.4.1.2.2.3 using the requested service option number; otherwise, the mobile station shall perform service option request initialization using NULL.

While in the *Traffic Channel Initialization Substate*, the mobile station shall perform the following:

- The mobile station shall perform pilot strength measurements as specified in 6.6.6.2.2, but shall not send *Pilot Strength Measurement Messages*.
- The mobile station shall perform registration timer maintenance as specified in 6.6.5.6.4.2.

1 If the mobile station does not support the assigned CDMA Channel (see 6.2.1.1) or the  
2 assigned Forward Traffic code channel, the mobile station shall enter the *System*  
3 *Determination Substate* of the *Mobile Station Initialization State*.

4 If the mobile station supports the assigned CDMA Channel and the assigned Forward  
5 Traffic code channel, the mobile station shall perform the following:

- 6 • The mobile station shall tune to the assigned CDMA Channel.
- 7 • The mobile station shall set its code channel for the assigned Forward Traffic code  
8 channel.
- 9 • The mobile station shall set its Forward and Reverse Traffic Channel frame offsets to  
10 the assigned frame offset.
- 11 • The mobile station shall set its Forward and Reverse Traffic Channel long code masks  
12 to the public long code mask (see 6.1.3.1.8).

13 If the mobile station does not receive  $N_{5m}$  consecutive good frames within  $T_{50m}$  seconds,  
14 the mobile station shall enter the *System Determination Substate* of the *Mobile Station*  
15 *Initialization State*.

16 If the mobile station receives  $N_{5m}$  consecutive good frames within  $T_{50m}$  seconds, the  
17 mobile station shall perform the following additional functions while it remains in the  
18 *Traffic Channel Initialization Substate*:

- 19 • The mobile station shall perform Forward Traffic Channel supervision as specified in  
20 6.4.4. If a loss of the Forward Traffic Channel is declared, the mobile station shall  
21 enter the *System Determination Substate* of the *Mobile Station Initialization State*.
- 22 • The mobile station shall adjust its transmit power as specified in 6.1.2.3.2.
- 23 • The mobile station shall transmit the Traffic Channel preamble as specified in  
24 6.1.3.3.10.3.
- 25 • The mobile station shall perform the acknowledgement procedures as specified in  
26 6.6.4.1.3. If an acknowledgement failure is declared, the mobile station shall disable  
27 its transmitter and enter the *System Determination Substate* of the *Mobile Station*  
28 *Initialization State*.

29 If the mobile station does not receive a *Base Station Acknowledgement Order* within  $T_{51m}$   
30 seconds, the mobile station shall disable its transmitter and enter the *System Determination*  
31 *Substate* of the *Mobile Station Initialization State*.

32 If the mobile station receives a *Base Station Acknowledgement Order* within  $T_{51m}$  seconds,  
33 the mobile station shall perform the following:

- 34 • If the call is mobile station terminated, the mobile station shall enter the *Waiting for*  
35 *Order Substate*.
- 36 • If the call is mobile station originated, the mobile station shall enter the *Conversation*  
37 *Substate*.

### 6.6.4.3 Alerting

#### 6.6.4.3.1 Waiting for Order Substate

In this substate, the mobile station waits for an *Alert With Information Message*.

Upon entering the *Waiting for Order Substate*, the mobile station shall set the substate timer for  $T_{52m}$  seconds.

While in the *Waiting for Order Substate*, the mobile station shall perform the following:

- If the substate timer expires, the mobile station shall disable its transmitter and enter the *System Determination Substate* of the *Mobile Station Initialization State*.
- The mobile station shall perform Forward Traffic Channel supervision as specified in 6.4.4. If a loss of the Forward Traffic Channel is declared, the mobile station shall enter the *System Determination Substate* of the *Mobile Station Initialization State*.
- The mobile station shall adjust its transmit power as specified in 6.1.2.3.2.
- The mobile station shall perform Forward Traffic Channel power control as specified in 6.6.4.1.1.
- The mobile station shall perform handoff processing as specified in 6.6.6.
- The mobile station shall transfer the received primary traffic packets to the primary traffic service option application.
- The mobile station shall transmit null Traffic Channel data on the Reverse Traffic Channel (see 6.1.3.3.10.4).
- The mobile station shall perform registration timer maintenance as specified in 6.6.5.6.4.2.
- If the mobile station is directed by the user to transmit a message, the mobile station shall send a *Data Burst Message*.
- If the mobile station is directed by the user to request a service option, the mobile station shall perform service option request initialization as specified in 6.6.4.1.2.2.3, and shall send a *Service Option Request Order* (ORDQ = requested service option number).
- If the mobile station is directed by the user to request a private long code transition and has the long code mask (see 6.3.12.3), the mobile station shall send a *Long Code Transition Request Order* (ORDQ = '00000001') as a message requiring acknowledgement.
- If the mobile station is directed by the user to request a public long code transition, the mobile station shall send a *Long Code Transition Request Order* (ORDQ = '00000000') as a message requiring acknowledgement.
- If the mobile station is directed by the user to operate in analog mode, the mobile station shall send the *Request Analog Service Order* as a message requiring acknowledgement.



- 1       • If the mobile station is directed by the user to power down, the mobile station shall  
2       enter the *Release Substate* with a power-down indication (see 6.6.4.5).
- 3       • The mobile station shall perform the acknowledgement procedures as specified in  
4       6.6.4.1.3. If an acknowledgement failure is declared, the mobile station shall disable  
5       its transmitter and enter the *System Determination Substate* of the *Mobile Station*  
6       *Initialization State*.
- 7       • If the mobile station receives a message which is included in the following list and  
8       every message field value is within its permissible range, the mobile station shall  
9       process the message as described below and in accordance with the message's action  
10      time (see 6.6.4.1.5).
  - 11      1. *Alert With Information Message*: The mobile station should alert the user and  
12      shall enter the *Waiting for Mobile Station Answer Substate* (see 6.6.4.3.2).
  - 13      2. *Analog Handoff Direction Message*: The mobile station shall process the message  
14      as specified in 6.6.6.2.9, and enter the *Waiting For Order Task* (see 2.6.4.3.1)  
15      with a handoff from CDMA indication.
  - 16      3. *Authentication Challenge Message*: The mobile station shall reset the substate  
17      timer for  $T_{52m}$  seconds. The mobile station shall then process the message and  
18      respond as specified in 6.3.12.1.5 within  $T_{32m}$  seconds.
  - 19      4. *Base Station Acknowledgement Order*: No requirements.
  - 20      5. *Base Station Challenge Confirmation Order*: The mobile station shall reset the  
21      substate timer for  $T_{52m}$  seconds. The mobile station shall then process the  
22      message and respond with an *SSD Update Confirmation Order* or *SSD Update*  
23      *Rejection Order* as specified in 6.3.12.1.9 within  $T_{32m}$  seconds.
  - 24      6. *Data Burst Message*: No requirements.
  - 25      7. *Handoff Direction Message*: The mobile station shall process the message as  
26      specified in 6.6.6.2.5.1. The mobile station shall reset the substate timer for  
27       $T_{52m}$  seconds.
  - 28      8. *In-Traffic System Parameters Message*: The mobile station shall process the  
29      message as specified in 6.6.4.1.4.
  - 30      9. *Local Control Order*: No requirements.
  - 31      10. *Lock Order*: The mobile station shall disable its transmitter and record the  
32      reason for the *Lock Order* in the mobile station's semi-permanent memory  
33      ( $LCKRSN_{s-p} = ORDQ_r$ ). The mobile station should notify the user of the locked  
34      condition. The mobile station shall enter the *System Determination Substate* of  
35      the *Mobile Station Initialization State*, and shall not enter the *System Access*  
36      *State* again until it has received an *Unlock Order*. This requirement shall take  
37      precedence over any other mobile station requirement specifying entry to the  
38      *System Access State*.
  - 39      11. *Lock Until Power-Cycled Order*: The mobile station shall disable its transmitter  
40      and record the reason for the *Lock Until Power-Cycled Order* in the mobile

station's semi-permanent memory ( $LCKRSN_{P-s-p} = ORDQ_r$ ). The mobile station should notify the user of the locked condition. The mobile station shall enter the *System Determination Substate* of the *Mobile Station Initialization State*, and shall not enter the *System Access State* again until after the next mobile station power-up or until it has received an *Unlock Order*. This requirement shall take precedence over any other mobile station requirement specifying entry to the *System Access State*.

12. *Long Code Transition Request Order*: If the *Long Code Transition Request Order* requests a private long code transition, the mobile station is able to generate the private long code (see 6.3.12.3), and the mobile station accepts the request, the mobile station shall send a *Long Code Transition Response Order* ( $ORDQ = '00000011'$ ) within  $T_{56m}$  seconds. The mobile station shall use the private long code on both the Forward Traffic Channel and the Reverse Traffic Channel. If  $USE\_TIME$  equals '0', the mobile station shall begin using the private long code at the first 80 ms boundary (relative to the start of System Time) after  $N_{4m}$  frames from the end of the response transmission. The mobile station should turn on the voice privacy indicator. If the *Long Code Transition Request Order* requests a private long code transition, and the mobile station is not able to generate the private long code or the mobile station does not accept the request, the mobile station shall send a *Long Code Transition Response Order* ( $ORDQ = '00000010'$ ) within  $T_{56m}$  seconds.

If the *Long Code Transition Request Order* requests a public long code transition and the mobile station accepts the request, the mobile station shall send a *Long Code Transition Response Order* ( $ORDQ = '00000010'$ ) within  $T_{56m}$  seconds. The mobile station should turn off the voice privacy indicator. If the *Long Code Transition Request Order* requests a public long code transition, and the mobile station does not accept the request, the mobile station shall send a *Long Code Transition Response Order* ( $ORDQ = '00000011'$ ) within  $T_{56m}$  seconds.

13. *Maintenance Order*: The mobile station shall enter the *Waiting for Mobile Station Answer Substate*.
14. *Message Encryption Mode Order*: The mobile station shall process the message as specified in 6.3.12.2.
15. *Message Waiting Order*: No requirements.
16. *Mobile Station Registered Message*: The mobile station shall process the message as specified in 6.6.5.6.4.3.
17. *Neighbor List Update Message*: The mobile station shall process the message as specified in 6.6.6.2.6.3.
18. *Pilot Measurement Request Order*: The mobile station shall process the order as specified in 6.6.6.2.5.1.
19. *Power Control Parameters Message*: The mobile station shall process the message as specified in 6.6.4.1.1.2.

- 1       20. Release Order: The mobile station shall enter the *Release Substate* with a base  
2       station release indication (see 6.6.4.5).
- 3       21. Retrieve Parameters Message: If the mobile station can supply values for all of  
4       the parameters specified by the PARAMETER\_ID fields in the message, the  
5       mobile station shall send, within T<sub>56m</sub> seconds, a *Parameters Response*  
6       *Message*; otherwise, the mobile station shall send, within T<sub>56m</sub> seconds, a  
7       *Mobile Station Reject Order*.
- 8       22. Service Option Control Order: The mobile station shall transfer the *Service Option*  
9       *Control Order* to the primary traffic service option application.
- 10      23. Service Option Request Order: The mobile station shall process the message as  
11      specified in 6.6.4.1.2.2.1.
- 12      24. Service Option Response Order: The mobile station shall process the message as  
13      specified in 6.6.4.1.2.2.2.
- 14      25. Set Parameters Message: If the mobile station can set all of the parameters  
15      specified by the PARAMETER\_ID fields in the message, the mobile station shall  
16      set them; otherwise, the mobile station shall send, within T<sub>56m</sub> seconds, a  
17      *Mobile Station Reject Order*.
- 18      26. SSD Update Message: The mobile station shall reset the substate timer for T<sub>52m</sub>  
19      seconds. The mobile station shall then process the message and respond with a  
20      *Base Station Challenge Order* as specified in 6.3.12.1.9 within T<sub>32m</sub> seconds.
- 21      27. Status Request Order: The mobile station shall send, within T<sub>56m</sub> seconds, a  
22      *Status Message* to the base station.
- 23      • If the mobile station receives a message which is included in the above list and any  
24      message field value is not within its permissible range, the mobile station shall  
25      discard the message and send a *Mobile Station Reject Order* (ORDQ = '00000100')  
26      within T<sub>56m</sub> seconds.
- 27      • If the mobile station receives a message which is not included in the above list, the  
28      mobile station shall send the *Mobile Station Reject Order* (ORDQ = '00000010') within  
29      T<sub>56m</sub> seconds.

#### 30   6.6.4.3.2 Waiting for Mobile Station Answer Substate

31   In this substate, the mobile station waits for the user to answer the mobile station  
32   terminated call.

33   Upon entering the *Waiting for Mobile Station Answer Substate*, the mobile station shall set  
34   the substate timer for T<sub>53m</sub> seconds.

35   While in the *Waiting for Mobile Station Answer Substate*, the mobile station shall perform  
36   the following:

- 37      • If the substate timer expires, the mobile station shall disable its transmitter and  
38      enter the *System Determination Substate* of the *Mobile Station Initialization State*.

- 1       • The mobile station shall perform Forward Traffic Channel supervision as specified in  
2       6.4.4. If a loss of the Forward Traffic Channel is declared, the mobile station shall  
3       enter the *System Determination Substate* of the *Mobile Station Initialization State*.
- 4       • The mobile station shall adjust its transmit power as specified in 6.1.2.3.2.
- 5       • The mobile station shall perform Forward Traffic Channel power control as specified  
6       in 6.6.4.1.1.
- 7       • The mobile station shall perform handoff processing as specified in 6.6.6.
- 8       • The mobile station shall transfer the received primary traffic packets to the primary  
9       traffic service option application.
- 10       • The mobile station shall transmit null Traffic Channel data on the Reverse Traffic  
11       Channel (see 6.1.3.3.10.4).
- 12       • The mobile station shall perform registration timer maintenance as specified in  
13       6.6.5.6.4.2.
- 14       • If the mobile station is directed by the user to answer the call, the mobile station  
15       shall send a *Connect Order* to the base station as a message requiring  
16       acknowledgement. The mobile station shall enter the *Conversation Substate*.
- 17       • If the mobile station is directed by the user to transmit a message, the mobile station  
18       shall send a *Data Burst Message*.
- 19       • If the mobile station is directed by the user to request a service option, the mobile  
20       station shall perform service option request initialization as specified in 6.6.4.1.2.2.3,  
21       and shall send a *Service Option Request Order* (ORDQ = requested service option  
22       number).
- 23       • If the mobile station is directed by the user to request a private long code transition  
24       and has the long code mask (see 6.3.12.3), the mobile station shall send a *Long Code*  
25       *Transition Request Order* (ORDQ = '00000001') as a message requiring  
26       acknowledgement.
- 27       • If the mobile station is directed by the user to request a public long code transition,  
28       the mobile station shall send a *Long Code Transition Request Order* (ORDQ =  
29       '00000000') as a message requiring acknowledgement.
- 30       • If the mobile station is directed by the user to operate in analog mode, the mobile  
31       station shall send the *Request Analog Service Order* as a message requiring  
32       acknowledgement.
- 33       • If the mobile station is directed by the user to power down, the mobile station shall  
34       enter the *Release Substate* with a power-down indication (see 6.6.4.5).
- 35       • The mobile station shall perform the acknowledgement procedures as specified in  
36       6.6.4.1.3. If an acknowledgement failure is declared, the mobile station shall disable  
37       its transmitter and enter the *System Determination Substate* of the *Mobile Station*  
38       *Initialization State*.

- If the mobile station receives a message which is included in the following list and every message field value is within its permissible range, the mobile station shall process the message as described below and in accordance with the message's action time (see 6.6.4.1.5).
  1. *Alert With Information Message*: The mobile station shall reset the substate timer for  $T_{53m}$  seconds.
  2. *Analog Handoff Direction Message*: The mobile station shall process the message as specified in 6.6.6.2.9 and enter the Waiting For Answer Task (see 2.6.4.3.2) with a handoff from CDMA indication.
  3. *Authentication Challenge Message*: The mobile station shall process the message and respond as specified in 6.3.12.1.5 within  $T_{32m}$  seconds.
  4. *Base Station Acknowledgement Order*: No requirements.
  5. *Base Station Challenge Confirmation Order*: The mobile station shall process the message and respond with an *SSD Update Confirmation Order* or *SSD Update Rejection Order* as specified in 6.3.12.1.9 within  $T_{32m}$  seconds.
  6. *Data Burst Message*: No requirements.
  7. *Handoff Direction Message*: The mobile station shall process the message as specified in 6.6.6.2.5.1.
  8. *In-Traffic System Parameters Message*: The mobile station shall process the message as specified in 6.6.4.1.4.
  9. *Local Control Order*: No requirements.
  10. *Lock Order*: The mobile station shall disable its transmitter and record the reason for the *Lock Order* in the mobile station's semi-permanent memory ( $LCKRSN_{S-p} = ORDQ_r$ ). The mobile station should notify the user of the locked condition. The mobile station shall enter the *System Determination Substate* of the *Mobile Station Initialization State*, and shall not enter the *System Access State* again until it has received an *Unlock Order*. This requirement shall take precedence over any other mobile station requirement specifying entry to the *System Access State*.
  11. *Lock Until Power-Cycled Order*: The mobile station shall disable its transmitter and record the reason for the *Lock Until Power-Cycled Order* in the mobile station's semi-permanent memory ( $LCKRSN_{P-s-p} = ORDQ_r$ ). The mobile station should notify the user of the locked condition. The mobile station shall enter the *System Determination Substate* of the *Mobile Station Initialization State*, and shall not enter the *System Access State* again until after the next mobile station power-up or until it has received an *Unlock Order*. This requirement shall take precedence over any other mobile station requirement specifying entry to the *System Access State*.
  12. *Long Code Transition Request Order*: If the *Long Code Transition Request Order* requests a private long code transition, the mobile station is able to generate the private long code (see 6.3.12.3), and the mobile station accepts the request, the

mobile station shall send a *Long Code Transition Response Order* (ORDQ = '00000011') within  $T_{56m}$  seconds. The mobile station shall use the private long code on both the Forward Traffic Channel and the Reverse Traffic Channel. If USE\_TIME equals '0', the mobile station shall begin using the private long code at the first 80 ms boundary (relative to the start of System Time) after  $N_{4m}$  frames from the end of the response transmission. The mobile station should turn on the voice privacy indicator. If the *Long Code Transition Request Order* requests a private long code transition, and the mobile station is not able to generate the private long code or the mobile station does not accept the request, the mobile station shall send a *Long Code Transition Response Order* (ORDQ = '00000010') within  $T_{56m}$  seconds.

If the *Long Code Transition Request Order* requests a public long code transition and the mobile station accepts the request, the mobile station shall send a *Long Code Transition Response Order* (ORDQ = '00000010') within  $T_{56m}$  seconds. The mobile station should turn off the voice privacy indicator. If the *Long Code Transition Request Order* requests a public long code transition, and the mobile station does not accept the request, the mobile station shall send a *Long Code Transition Response Order* (ORDQ = '00000011') within  $T_{56m}$  seconds.

13. *Maintenance Order*: The mobile station shall reset the substate timer for  $T_{53m}$  seconds.
14. *Message Encryption Mode Order*: The mobile station shall process the message as specified in 6.3.12.2.
15. *Message Waiting Order*: No requirements.
16. *Mobile Station Registered Message*: The mobile station shall process the message as specified in 6.6.5.6.4.3.
17. *Neighbor List Update Message*: The mobile station shall process the message as specified in 6.6.6.2.6.3.
18. *Pilot Measurement Request Order*: The mobile station shall process the order as specified in 6.6.6.2.5.1.
19. *Power Control Parameters Message*: The mobile station shall process the message as specified in 6.6.4.1.1.2.
20. *Release Order*: The mobile station shall enter the *Release Substate* with a base station release indication (see 6.6.4.5).
21. *Retrieve Parameters Message*: If the mobile station can supply values for all of the parameters specified by the PARAMETER\_ID fields in the message, the mobile station shall send, within  $T_{56m}$  seconds, a *Parameters Response Message*; otherwise, the mobile station shall send, within  $T_{56m}$  seconds, a *Mobile Station Reject Order*.
22. *Service Option Control Order*: The mobile station shall transfer the *Service Option Control Order* to the primary traffic service option application.

- 1        23. Service Option Request Order: The mobile station shall process the message as  
2        specified in 6.6.4.1.2.2.1.
- 3        24. Service Option Response Order: The mobile station shall process the message as  
4        specified in 6.6.4.1.2.2.2.
- 5        25. Set Parameters Message: If the mobile station can set all of the parameters  
6        specified by the PARAMETER\_ID fields in the message, the mobile station shall  
7        set them; otherwise, the mobile station shall send, within T<sub>56m</sub> seconds, a  
8        *Mobile Station Reject Order*.
- 9        26. SSD Update Message: The mobile station shall process the message and  
10       respond with a *Base Station Challenge Order* as specified in 6.3.12.1.9 within  
11       T<sub>32m</sub> seconds.
- 12       27. Status Request Order: The mobile station shall send, within T<sub>56m</sub> seconds, a  
13       *Status Message*.
- 14       • If the mobile station receives a message which is included in the above list and any  
15       message field value is not within its permissible range, the mobile station shall  
16       discard the message and send a *Mobile Station Reject Order* (ORDQ = '00000100')  
17       within T<sub>56m</sub> seconds.
- 18       • If the mobile station receives a message which is not included in the above list, the  
19       mobile station shall send the *Mobile Station Reject Order* (ORDQ = '00000010') within  
20       T<sub>56m</sub> seconds.

#### 21       6.6.4.4 Conversation Substate

22       In this substate, the mobile station's primary traffic service option application exchanges  
23       primary traffic packets with the base station.

24       While in the *Conversation Substate*, the mobile station shall perform the following:

- 25       • The mobile station shall perform Forward Traffic Channel supervision as specified in  
26       6.4.4. If a loss of the Forward Traffic Channel is declared, the mobile station shall  
27       enter the *System Determination Substate* of the *Mobile Station Initialization State*.
- 28       • The mobile station shall adjust its transmit power as specified in 6.1.2.3.2.
- 29       • The mobile station shall perform Forward Traffic Channel power control as specified  
30       in 6.6.4.1.1.
- 31       • The mobile station shall perform handoff processing as specified in 6.6.6.
- 32       • The mobile station shall transfer the received primary traffic packets to the primary  
33       traffic service option application.
- 34       • The mobile station shall transmit primary traffic packets from the primary traffic  
35       service option application.
- 36       • The mobile station shall perform registration timer maintenance as specified in  
37       6.6.5.6.4.2.

- 1       • If the mobile station originated the call and did not send all the dialed digits in the  
2       *Origination Message*, the mobile station shall send the remaining dialed digits to the  
3       base station in the *Origination Continuation Message*. The mobile station shall send  
4       the *Origination Continuation Message* as a message requiring acknowledgement  
5       within  $T_{54m}$  seconds after entering the *Conversation Substate*.
- 6       • If the mobile station is directed by the user to transmit a message, the mobile station  
7       shall send a *Data Burst Message*.
- 8       • If the mobile station is directed by the user to request a service option, the mobile  
9       station shall perform service option request initialization as specified in 6.6.4.1.2.2.3,  
10      and shall send a *Service Option Request Order* (ORDQ = requested service option  
11      number).
- 12      • If the mobile station is directed by the user to request a private long code transition  
13      and has the long code mask (see 6.3.12.3), the mobile station shall send a *Long Code*  
14      *Transition Request Order* (ORDQ = '00000001') as a message requiring  
15      acknowledgement.
- 16      • If the mobile station is directed by the user to request a public long code transition,  
17      the mobile station shall send a *Long Code Transition Request Order* (ORDQ =  
18      '00000000') as a message requiring acknowledgement.
- 19      • If the mobile station is directed by the user to issue a flash, the mobile station shall  
20      build a *Flash With Information Message* with the collected digits and send the  
21      message to the base station as a message requiring acknowledgement.
- 22      • If the mobile station is directed by the user to send burst DTMF digits, the mobile  
23      station shall build the *Send Burst DTMF Message* with the dialed digits and send the  
24      message as a message requiring acknowledgement.
- 25      • If the mobile station is directed by the user to send a continuous DTMF digit, the  
26      mobile station shall build the *Continuous DTMF Tone Order* with the dialed digit and  
27      send the order as a message requiring acknowledgement. When the mobile station is  
28      directed by the user to cease sending the continuous DTMF digit, the mobile station  
29      shall send the *Continuous DTMF Tone Order* (ORDQ = '11111111') as a message  
30      requiring acknowledgement.
- 31      • If the mobile station is directed by the user to operate in analog mode, the mobile  
32      station shall send the *Request Analog Service Order* as a message requiring  
33      acknowledgement.
- 34      • If the mobile station is directed by the user to disconnect the call, the mobile station  
35      shall enter the *Release Substate* with a mobile station release indication (see 6.6.4.5).
- 36      • If the mobile station is directed by the user to power down, the mobile station shall  
37      enter the *Release Substate* with a power-down indication (see 6.6.4.5).
- 38      • The mobile station shall perform the acknowledgement procedures as specified in  
39      6.6.4.1.3. If an acknowledgement failure is declared, the mobile station shall disable  
40      its transmitter and enter the *System Determination Substate* of the *Mobile Station*  
41      *Initialization State*.



- If the mobile station receives a message which is included in the following list and every message field value is within its permissible range, the mobile station shall process the message as described below and in accordance with the message's action time (see 6.6.4.1.5).
  1. Alert With Information Message: If the message contains a signal information record with the SIGNAL\_TYPE field set to '01' or '10', the mobile station shall enter the *Waiting For Mobile Station Answer Substate*.
  2. Analog Handoff Direction Message: The mobile station shall process the message as specified in 6.6.6.2.9 and enter the Conversation Task (see 2.6.4.4) with a handoff from CDMA indication.
  3. Authentication Challenge Message: The mobile station shall process the message and respond as specified in 6.3.12.1.5 within  $T_{32m}$  seconds.
  4. Base Station Acknowledgement Order: No requirements.
  5. Base Station Challenge Confirmation Order: The mobile station shall process the message and respond with an *SSD Update Confirmation Order* or *SSD Update Rejection Order* as specified in 6.3.12.1.9 within  $T_{32m}$  seconds.
  6. Continuous DTMF Tone Order: No requirements.
  7. Data Burst Message: No requirements.
  8. Flash with Information Message: No requirements.
  9. Handoff Direction Message: The mobile station shall process the message as specified in 6.6.6.2.5.1.
  10. In-Traffic System Parameters Message: The mobile station shall process the message as specified in 6.6.4.1.4.
  11. Local Control Order: No requirements.
  12. Lock Order: The mobile station shall disable its transmitter and record the reason for the *Lock Order* in the mobile station's semi-permanent memory ( $LCKRSN_{S-p} = ORDQ_r$ ). The mobile station should notify the user of the locked condition. The mobile station shall enter the *System Determination Substate* of the *Mobile Station Initialization State*, and shall not enter the *System Access State* again until it has received an *Unlock Order*. This requirement shall take precedence over any other mobile station requirement specifying entry to the *System Access State*.
  13. Lock Until Power-Cycled Order: The mobile station shall disable its transmitter and record the reason for the *Lock Until Power-Cycled Order* in the mobile station's semi-permanent memory ( $LCKRSN_{P-s-p} = ORDQ_r$ ). The mobile station should notify the user of the locked condition. The mobile station shall enter the *System Determination Substate* of the *Mobile Station Initialization State*, and shall not enter the *System Access State* again until after the next mobile station power-up or until it has received an *Unlock Order*. This requirement shall take

precedence over any other mobile station requirement specifying entry to the *System Access State*.

14. *Long Code Transition Request Order*: If the *Long Code Transition Request Order* requests a private long code transition, the mobile station is able to generate the private long code (see 6.3.12.3), and the mobile station accepts the request, the mobile station shall send a *Long Code Transition Response Order* (ORDQ = '00000011') within  $T_{56m}$  seconds. The mobile station shall use the private long code on both the Forward Traffic Channel and the Reverse Traffic Channel. If USE\_TIME equals '0', the mobile station shall begin using the private long code at the first 80 ms boundary (relative to the start of System Time) after  $N_{4m}$  frames from the end of the response transmission. The mobile station should turn on the voice privacy indicator. If the *Long Code Transition Request Order* requests a private long code transition, and the mobile station is not able to generate the private long code or the mobile station does not accept the request, the mobile station shall send a *Long Code Transition Response Order* (ORDQ = '00000010') within  $T_{56m}$  seconds.

If the *Long Code Transition Request Order* requests a public long code transition and the mobile station accepts the request, the mobile station shall send a *Long Code Transition Response Order* (ORDQ = '00000010') within  $T_{56m}$  seconds. The mobile station should turn off the voice privacy indicator. If the *Long Code Transition Request Order* requests a public long code transition, and the mobile station does not accept the request, the mobile station shall send a *Long Code Transition Response Order* (ORDQ = '00000011') within  $T_{56m}$  seconds.

15. *Maintenance Order*: The mobile station shall enter the *Waiting for Mobile Station Answer Substate*.
16. *Message Encryption Mode Order*: The mobile station shall process the message as specified in 6.3.12.2.
17. *Message Waiting Order*: No requirements.
18. *Mobile Station Registered Message*: The mobile station shall process the message as specified in 6.6.5.6.4.3.
19. *Neighbor List Update Message*: The mobile station shall process the message as specified in 6.6.6.2.6.3.
20. *Pilot Measurement Request Order*: The mobile station shall process the order as specified in 6.6.6.2.5.1.
21. *Power Control Parameters Message*: The mobile station shall process the message as specified in 6.6.4.1.1.2.
22. *Release Order*: The mobile station shall enter the *Release Substate* with a base station release indication (see 6.6.4.5).
23. *Retrieve Parameters Message*: If the mobile station can supply values for all of the parameters specified by the PARAMETER\_ID fields in the message, the mobile station shall send, within  $T_{56m}$  seconds, a *Parameters Response*

1            *Message*; otherwise, the mobile station shall send, within T<sub>56m</sub> seconds, a  
2            *Mobile Station Reject Order*.

3            24. *Send Burst DTMF Message*: No requirements.

4            25. *Service Option Control Order*: The mobile station shall transfer the *Service Option*  
5            *Control Order* to the primary traffic service option application.

6            26. *Service Option Request Order*: The mobile station shall process the message as  
7            specified in 6.6.4.1.2.2.1.

8            27. *Service Option Response Order*: The mobile station shall process the message as  
9            specified in 6.6.4.1.2.2.2.

10           28. *Set Parameters Message*: If the mobile station can set all of the parameters  
11           specified by the PARAMETER\_ID fields in the message, the mobile station shall  
12           set them; otherwise, the mobile station shall send, within T<sub>56m</sub> seconds, a  
13           *Mobile Station Reject Order*.

14           29. *SSD Update Message*: The mobile station shall process the message and  
15           respond with a *Base Station Challenge Order* as specified in 6.3.12.1.9 within  
16           T<sub>32m</sub> seconds.

17           30. *Status Request Order*: The mobile station shall send, within T<sub>56m</sub> seconds, a  
18           *Status Message*.

- 19           • If the mobile station receives a message which is included in the above list and any  
20           message field value is not within its permissible range, the mobile station shall  
21           discard the message and send a *Mobile Station Reject Order* (ORDQ = '00000100')  
22           within T<sub>56m</sub> seconds.
- 23           • If the mobile station receives a message which is not included in the above list, the  
24           mobile station shall send the *Mobile Station Reject Order* (ORDQ = '00000010') within  
25           T<sub>56m</sub> seconds.

#### 26           6.6.4.5 Release Substate

27           In this substate, the mobile station confirms the call disconnect.

28           Upon entering the *Release Substate*, the mobile station shall perform the following:

- 29           • The mobile station shall set the substate timer for T<sub>55m</sub> seconds.
- 30           • If the mobile station enters the *Release Substate* with a power-down indication, the  
31           mobile station shall send a *Release Order* (ORDQ = '00000001'), and perform  
32           registration power-down (see 6.6.5.6.4.3).
- 33           • If the mobile station enters the *Release Substate* with a mobile station release  
34           indication, the mobile station shall send a *Release Order* (ORDQ = '00000000').
- 35           • If the mobile station enters the *Release Substate* with a base station release  
36           indication, the mobile station shall send a *Release Order* (ORDQ = '00000000'). The  
37           mobile station shall disable its transmitter and enter the *System Determination*  
38           *Substate* of the *Mobile Station Initialization State*.

While in the *Release Substate*, the mobile station shall perform the following:

- If the substate timer expires, the mobile station shall disable its transmitter and enter the *System Determination Substate* of the *Mobile Station Initialization State*.
- The mobile station shall perform Forward Traffic Channel supervision as specified in 6.4.4. If a loss of the Forward Traffic Channel is declared, the mobile station shall enter the *System Determination Substate* of the *Mobile Station Initialization State*.
- The mobile station shall adjust its transmit power as specified in 6.1.2.3.2.
- The mobile station shall perform Forward Traffic Channel power control as specified in 6.6.4.1.1.
- The mobile station shall perform handoff processing as specified in 6.6.6.
- The mobile station shall transmit null Traffic Channel data on the Reverse Traffic Channel (see 6.1.3.3.10.4).
- The mobile station shall perform registration timer maintenance as specified in 6.6.5.6.4.2.
- The mobile station shall perform the acknowledgement procedures as specified in 6.6.4.1.3. If an acknowledgement failure is declared, the mobile station shall disable its transmitter and enter the *System Determination Substate* of the *Mobile Station Initialization State*.
- If the mobile station receives a message which is included in the following list and every message field value is within its permissible range, the mobile station shall process the message as described below and in accordance with the message's action time (see 6.6.4.1.5).
  1. *Alert With Information Message*: The mobile shall enter the *Waiting for Mobile Station Answer Substate*.
  2. *Base Station Acknowledgement Order*: No requirements.
  3. *Data Burst Message*: No requirements.
  4. *Handoff Direction Message*: The mobile station shall process the message as specified in 6.6.6.2.5.1.
  5. *In-Traffic System Parameters Message*: The mobile station shall process the message as specified in 6.6.4.1.4.
  6. *Local Control Order*: No requirements.
  7. *Lock Order*: The mobile station shall disable its transmitter and record the reason for the Lock Order in the mobile station's semi-permanent memory ( $LCKRSN_{S-p} = ORDQ_r$ ). The mobile station should notify the user of the locked condition. The mobile station shall enter the *System Determination Substate* of the *Mobile Station Initialization State*, and shall not enter the *System Access State* again until it has received an *Unlock Order*. This requirement shall take precedence over any other mobile station requirement specifying entry to the *System Access State*.

8. *Lock Until Power-Cycled Order*: The mobile station shall disable its transmitter and record the reason for the *Lock Until Power-Cycled Order* in the mobile station's semi-permanent memory (LCKRSN\_P<sub>S-p</sub> = ORDQ<sub>r</sub>). The mobile station should notify the user of the locked condition. The mobile station shall enter the *System Determination Substate* of the *Mobile Station Initialization State*, and shall not enter the *System Access State* again until after the next mobile station power-up or until it has received an *Unlock Order*. This requirement shall take precedence over any other mobile station requirement specifying entry to the *System Access State*.
  9. *Message Waiting Order*: No requirements.
  10. *Mobile Station Registered Message*: The mobile station shall process the message as specified in 6.6.5.6.4.3.
  11. *Neighbor List Update Message*: The mobile station shall process the message as specified in 6.6.6.2.6.3.
  12. *Power Control Parameters Message*: The mobile station shall process the message as specified in 6.6.4.1.1.2.
  13. *Release Order*: The mobile station shall disable its transmitter. If the mobile station enters the *Release Substate* with a power-down indication, the mobile station may power down; otherwise, the mobile station shall enter the *System Determination Substate* of the *Mobile Station Initialization State*.
  14. *Retrieve Parameters Message*: If the mobile station can supply values for all of the parameters specified by the PARAMETER\_ID fields in the message, the mobile station shall send, within T<sub>56m</sub> seconds, a *Parameters Response Message*; otherwise, the mobile station shall send, within T<sub>56m</sub> seconds, a *Mobile Station Reject Order*.
- If the mobile station receives a message which is included in the above list and any message field value is not within its permissible range, the mobile station shall discard the message and send a *Mobile Station Reject Order* (ORDQ = '00000100') within T<sub>56m</sub> seconds.
  - If the mobile station receives a message which is not included in the above list, the mobile station shall send the *Mobile Station Reject Order* (ORDQ = '00000010') within T<sub>56m</sub> seconds.

## 6.6.5 Registration

### 6.6.5.1 Forms of Registration

Registration is the process by which the mobile station notifies the base station of its location, status, identification, slot cycle, station class, and other characteristics. The mobile station informs the base station of its location and status so that the base station can efficiently page the mobile station when establishing a mobile terminated call. The mobile station supplies the base station with the set of MINs that are active. This allows the base station to know which mobile station to contact when handling a mobile

terminated call. If operating in the slotted mode, the mobile station supplies the SLOT\_CYCLE\_INDEX parameter so that the base station knows which slots the mobile station is monitoring. The mobile station supplies the station class mark and CAI revision number so that the base station knows the capabilities of the mobile station.

The CDMA system supports nine different forms of registration:

1. Power-up registration. The mobile station registers when it powers on, switches from using the alternate serving system, or switches from using the analog system.
2. Power-down registration. The mobile station registers when it powers off if previously registered in the current serving system.
3. Timer-based registration. The mobile station registers when a timer expires.
4. Distance-based registration. The mobile station registers when the distance between the current base station and the base station in which it last registered exceeds a threshold.
5. Zone-based registration. The mobile station registers when it enters a new zone.
6. Parameter-change registration. The mobile station registers when certain of its stored parameters change.
7. Ordered registration. The mobile station registers when the base station requests it.
8. Implicit registration. When a mobile station successfully uses the Access Channel, the base station can infer the mobile station's location, causing an implicit registration.
9. Traffic Channel registration. Whenever the base station has registration information for a mobile station that has been assigned to a Traffic Channel, the base station can notify the mobile station that it is registered.

The first six forms are called autonomous registrations since the mobile station initiates the registration in response to an event, (i.e., without being explicitly directed to register by the base station). The first five forms of registration, as a group, are called class C registration and are enabled by roaming status for any MIN (see 6.6.5.3). Autonomous parameter-change registration is independent of MIN roaming status. Ordered registration is initiated by the base station through an *Order Message*. Implicit registration does not involve the exchange of any registration messages between the base station and the mobile station. While a mobile station is assigned a Traffic Channel, the base station can obtain registration information by using the *Status Request Order* to obtain *Status Messages* from the mobile station. The mobile station can be notified that it is registered through the *Mobile Station Registered Message*.

Any of the various forms of autonomous registration can be enabled or disabled. The forms of registration that are enabled and the corresponding registration parameters are communicated in the *System Parameters Message*.

In addition, the mobile station may enable or disable class C registration for each MIN for each type of roaming described in 6.6.5.3.

#### 6.6.5.1.1 Power-Up Registration

Power-up registration is performed when the mobile station is turned on. So that a mobile station is not continually registering when power is quickly turned on and off, the mobile station delays  $T_{57m}$  seconds before registering after entering the *Mobile Station Idle State*.

The mobile station shall maintain a power-up/initialization timer. While the power-up/initialization timer is active, the mobile station shall not make registration access attempts.

When power-up registration is performed, the mobile station shall perform an initial registration (see 6.6.5.4).

#### 6.6.5.1.2 Power-Down Registration

Power-down registration is performed when the user directs the mobile station to power off. If power-down registration is performed, the mobile station does not power down until after completing the registration attempt.

The mobile station shall not perform power-down registration if it has not previously registered with the current base station.

When power-down registration is performed, the mobile station shall perform a registration update (see 6.6.5.4). The *Registration Update Message* shall not contain any added or deleted MINs.

#### 6.6.5.1.3 Timer-Based Registration

Timer-based registration causes the mobile station to register at regular intervals. Its use also allows the system to automatically deregister mobile stations that did not perform a successful power-down registration. Timer-based registration uses a Paging Channel slot counter (equivalent to a timer with time increments of 200 ms). Timer-based registration is performed when the counter reaches a maximum value ( $REG\_COUNT\_MAX_S$ ) that is controlled by the base station via the  $REG\_PRD$  field of the *System Parameters Message*. The base station disables timer-based registration by setting  $REG\_PRD$  to zero.

The counter is reset on power-up and when switching from analog or alternate serving systems. The counter is also reset after each successful system access (implicit registration).

The mobile station shall maintain a timer-based registration counter ( $REG\_COUNT_S$ ). The mobile station shall compute and store the timer expiration count ( $REG\_COUNT\_MAX_S$ ) as

$$REG\_COUNT\_MAX_S = \lfloor 2^{REG\_PRD/4} \rfloor.$$

The mobile station shall maintain an indicator of timer-based registration timer enable status ( $COUNTER\_ENABLED_S$ ).

Whenever the mobile station changes  $COUNTER\_ENABLED_S$  from NO to YES, it shall set  $REG\_COUNT_S$  to a pseudorandom value between 0 and  $REG\_COUNT\_MAX_S - 1$ , using the pseudorandom number generator specified in 6.6.7.2.

If the mobile station is operating in the non-slotted mode, it shall increment the timer-based registration counter once per 200 ms whenever  $COUNTER\_ENABLED_S$  equals YES.

If the mobile station is operating in slotted mode, it may increment the timer-based registration counter when it begins to monitor the Paging Channel (see 6.6.2.1.1.3). A mobile station operating in the slotted mode shall increment the counter by the same amount that the counter would have been incremented if the mobile station had been operating in the non-slotted mode.<sup>23</sup>

#### 6.6.5.1.4 Distance-Based Registration

Distance-based registration causes a mobile station to register when the distance between the current base station and the base station in which it last registered exceeds a threshold. The mobile station determines that it has moved a certain distance by computing a distance measure based on the difference in latitude and longitude between the current base station and the base station where the mobile station last registered. If this distance measure exceeds the threshold value, the mobile station registers.

The mobile station stores the base station latitude (BASE\_LAT\_REG<sub>S-p</sub>), the base station longitude (BASE\_LONG\_REG<sub>S-p</sub>) and the registration distance (REG\_DIST\_REG<sub>S-p</sub>), of the base station whose Access Channel was used for the mobile station's last registration (see 6.3.4). The mobile station shall compute the current base station's distance from the last registration point (DISTANCE) as:

$$\text{DISTANCE} = \left\lfloor \frac{\sqrt{(\Delta\text{lat})^2 + (\Delta\text{long})^2}}{16} \right\rfloor,$$

where

$$\Delta\text{lat} = \text{BASE\_LAT}_S - \text{BASE\_LAT\_REG}_{S-p}$$

$$\Delta\text{long} = (\text{BASE\_LONG}_S - \text{BASE\_LONG\_REG}_{S-p}) \times \cos(\pi/180 \times \text{BASE\_LAT\_REG}_{S-p}/14400).$$

The mobile station shall compute DISTANCE with an error of no more than  $\pm 5\%$  of its true value when  $|\text{BASE\_LAT\_REG}_{S-p}/14400|$  is less than 60 and with an error of no more than  $\pm 7\%$  of its true value when  $|\text{BASE\_LAT\_REG}_{S-p}/14400|$  is between 60 and 70.<sup>24</sup>

#### 6.6.5.1.5 Zone-Based Registration

Zones are groups of base stations within a given system and network. A base station's zone assignment is identified by the REG\_ZONE field of the *System Parameters Message*.

Zone-based registration causes a mobile station to register whenever it moves into a new zone not on its internally stored list of visited registration zones. A zone is added to the list whenever a registration (including implicit registration) occurs, and is deleted upon expiration of a timer. After a system access, timers are enabled for every zone except one that was successfully registered by the access. Timers are also enabled at the start of a call.

<sup>23</sup>For example, if the mobile station uses a 2 second slot cycle, then it may increment the counter by 10 every time it becomes active.

<sup>24</sup>BASE\_LAT and BASE\_LONG are given in units of 1/4 seconds. BASE\_LAT/14400 and BASE\_LONG/14400 are in units of degrees. There are several simple methods that provide the required accuracy and avoid explicitly taking the cosine and the square root.



1 A mobile station can be registered in more than one zone. Zones are uniquely identified by  
2 a zone number (REG\_ZONE) plus the SID and NID of the zone.

3 The mobile station shall store a list of the zones in which the mobile station has registered  
4 (ZONE\_LIST<sub>s</sub>). Each entry in ZONE\_LIST<sub>s</sub> shall include the zone number (REG\_ZONE) and  
5 the (SID, NID) pair for the zone. The mobile station shall be capable of storing at least N<sub>9m</sub>  
6 entries in ZONE\_LIST<sub>s</sub>. A base station shall be considered to be in ZONE\_LIST<sub>s</sub> only if the  
7 base station's REG\_ZONE, SID and NID are found in an entry in ZONE\_LIST<sub>s</sub>. The mobile  
8 station provides storage for one entry of ZONE\_LIST<sub>s</sub> in semi-permanent memory,  
9 ZONE\_LIST<sub>s-p</sub> (see 6.3.4).

10 The mobile station shall maintain a zone list entry timer for each entry in ZONE\_LIST<sub>s</sub>.  
11 When an entry in ZONE\_LIST<sub>s</sub> is removed from the list, the corresponding zone list entry  
12 timer shall be disabled. The timer duration shall be as determined from the stored value of  
13 ZONE\_TIMER<sub>s</sub> using Table 7.7.2.3.2.1-1. The mobile station shall provide a means to  
14 examine each timer's value while the timer is active, so that the age of list entries can be  
15 compared.

16 The base station controls the maximum number of zones in which a mobile station may be  
17 considered registered, by means of the TOTAL\_ZONES field of the *System Parameters*  
18 *Message*. When an entry is added to the zone list, or if TOTAL\_ZONES is decreased, the  
19 mobile station removes entries from the zone list if there are more entries than allowed by  
20 the setting of TOTAL\_ZONES.

21 Whenever ZONE\_LIST<sub>s</sub> contains more than TOTAL\_ZONES<sub>s</sub> entries, the mobile station shall  
22 delete the excess entries according to the following rules:

- 23 • If TOTAL\_ZONES<sub>s</sub> is equal to zero, the mobile station shall delete all entries.
- 24 • If TOTAL\_ZONES<sub>s</sub> is not equal to zero, the mobile station shall delete those entries  
25 having active zone list entry timers (excluding any such entry selected to be retained),  
26 starting with the oldest entry, as determined by the timer values, and continuing in  
27 order of decreasing age until no more than TOTAL\_ZONES<sub>s</sub> entries remain.

28 The mobile station shall store a list of the systems/networks in which the mobile station  
29 has registered (SID\_NID\_LIST<sub>s</sub>). Each entry in SID\_NID\_LIST<sub>s</sub> shall include the (SID, NID)  
30 pair for the system/network. The mobile station shall be capable of storing at least N<sub>10m</sub>  
31 entries in SID\_NID\_LIST<sub>s</sub>. A base station shall be considered to be in the SID\_NID\_LIST<sub>s</sub>  
32 only if the base station's SID and NID are found in an entry in SID\_NID\_LIST<sub>s</sub>. The mobile  
33 station shall provide storage for one entry of SID\_NID\_LIST<sub>s</sub> in semi-permanent memory  
34 (SID\_NID\_LIST<sub>s-p</sub>).

35 The mobile station shall maintain a SID/NID list entry timer for each entry in  
36 SID\_NID\_LIST<sub>s</sub>. When an entry in SID\_NID\_LIST<sub>s</sub> is removed from the list, the  
37 corresponding SID/NID list entry timer shall be disabled. The timer duration shall be as  
38 determined from the stored value of ZONE\_TIMER<sub>s</sub> using Table 7.7.2.3.2.1-1. The mobile  
39 station shall provide a means to examine each timer's value while the timer is active, so  
40 that the age of list entries can be compared.

41 Whenever SID\_NID\_LIST<sub>s</sub> contains more than N<sub>10m</sub> entries, the mobile station may delete  
42 the excess entries according to the following rule:

- The mobile station shall delete those entries having active SID/NID list entry timers, starting with the oldest entry, as determined by the timer values, and continuing in order of decreasing age.

When zone-based registration is performed, the mobile station may perform a registration update (see 6.6.5.4) if  $SID\_NID\_LIST_S$  contains an entry with the current base station's SID and NID ( $SID_S$  and  $NID_S$ ); otherwise, the mobile station shall perform an initial registration (see 6.6.5.4).

#### 6.6.5.1.6 Parameter-Change Registration

Parameter-change registration is performed when a mobile station modifies any of the following stored parameters:

- The preferred slot cycle index
- The station class mark
- An active MIN's home SID
- The list of active MINs (adding or deleting a MIN)

Parameter-change registration is independent of the roaming status of any MINs associated with the mobile station.<sup>25</sup>

Whenever a parameter changes, the mobile station shall delete all entries from  $SID\_NID\_LIST_S$ . When parameter-change registration is performed, the mobile station shall perform an initial registration (see 6.6.5.4).

#### 6.6.5.1.7 Ordered Registration

The base station can command the mobile station to register by sending a *Registration Request Order*. Ordered registration is performed in the *Mobile Station Order and Message Processing Operation* (6.6.2.4). Requirements are specified in 6.6.5.6.2.3.

#### 6.6.5.1.8 Implicit Registration

Whenever an access is completed, the base station can infer the location of the mobile station. This is treated as an implicit registration. Requirements are specified in 6.6.5.6.3.

#### 6.6.5.1.9 Traffic Channel Registration

While a mobile station is assigned a Traffic Channel, the mobile station is notified that it is registered through the *Mobile Station Registered Message*. Requirements are specified in 6.6.5.6.4.3.

#### 6.6.5.2 Systems and Networks

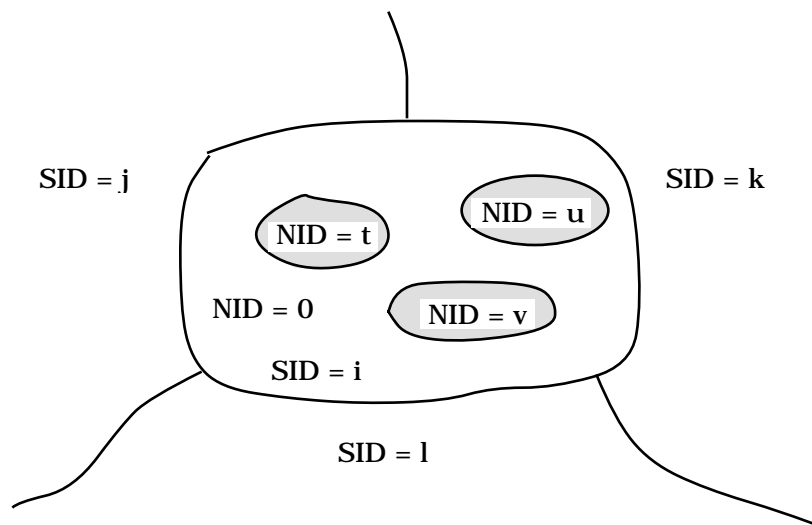
A base station is a member of a cellular system and a network. A network is a subset of a system.

---

<sup>25</sup>The indicator  $C\_REG\_ENABLED$  does not govern parameter-change registration.

Systems are labeled with an identification called the system identification or SID; networks within a system are given a network identification or NID. A network is uniquely identified by the pair (SID, NID). The NID number 0 is a reserved value indicating all base stations that are not included in a specific network. The NID number 65535 ( $2^{16}-1$ ) is a reserved value the mobile station may use for roaming status determination (see 6.6.5.3) to indicate that the mobile station considers the entire SID (regardless of NID) as home.

Figure 6.6.5.2-1 shows an example of systems and networks. SID i contains three networks labeled t, u, and v. A base station in system i that is not in one of these three networks is in NID 0.



**Figure 6.6.5.2-1. Systems and Networks Example**

### 6.6.5.3 Roaming MINs

The concept of roaming applies individually to each mobile station identification number (MIN) that is active in a mobile station. The mobile station, identified by the electronic serial number (ESN), may have one or more MINs associated with it. In addition, the same MIN can be entered into multiple mobile stations.<sup>26</sup> The mobile station informs the base station of these MINs during the registration process. Since neither the ESN nor the MIN directly provide a MIN's home system, a means is provided for identifying the home SID, where basic parameters for a particular MIN can be obtained.<sup>27</sup> This SID is given by the HOME\_SID parameter, which is transmitted in the *Initial Registration Message* and the *Registration Update Message*.

<sup>26</sup>Individual systems may or may not allow these capabilities. The management of these capabilities is a function of the base station and system operator.

<sup>27</sup>This system is where the Home Location Register (HLR) for this MIN is located.

For each MIN associated with the mobile station, the mobile station has a list of one or more home (SID, NID) pairs. A MIN is roaming if the stored (SID<sub>s</sub>, NID<sub>s</sub>) pair (received in the *System Parameters Message*) does not match one of the MIN's home (SID, NID) pairs. Two types of roaming are defined: A MIN is a foreign NID roamer if the MIN is roaming and there is some (SID, NID) pair in the MIN's (SID, NID) list for which SID is equal to SID<sub>s</sub>. A MIN is a foreign SID roamer if there is no (SID, NID) pair in the MIN's (SID, NID) list for which SID is equal to SID<sub>s</sub>.<sup>28</sup> The mobile station may use the special NID value 65535 to indicate that the mobile station considers all NIDs within a SID to be home (i.e., that the mobile station is not roaming when operating with any base station in that system).

For each MIN associated with the mobile station, the mobile station shall store three 1-bit parameters in its permanent memory (see 6.3.8). These parameters are MOB\_TERM\_HOME<sub>p</sub>, MOB\_TERM\_FOR\_SID<sub>p</sub>, and MOB\_TERM\_FOR\_NID<sub>p</sub>. The mobile station shall set MOB\_TERM\_HOME<sub>p</sub> to '1' if the mobile station is configured to receive mobile station terminated calls when using a home (SID, NID) pair; otherwise MOB\_TERM\_HOME<sub>p</sub> shall be set to '0'. The mobile station shall set MOB\_TERM\_FOR\_SID<sub>p</sub> to '1' if the mobile station is configured to receive mobile station terminated calls when it is a foreign SID roamer; otherwise MOB\_TERM\_FOR\_SID<sub>p</sub> shall be set to '0'. The mobile station shall set MOB\_TERM\_FOR\_NID<sub>p</sub> to '1' if the mobile station is configured to receive mobile station terminated calls when it is a foreign NID roamer; otherwise MOB\_TERM\_FOR\_NID<sub>p</sub> shall be set to '0'.

The mobile station determines the registration status for each MIN using these parameters and the HOME\_REG, FOR\_NID\_REG, and FOR\_SID\_REG fields of the *System Parameters Message*.

The mobile station shall store a mobile station call termination enabled indicator, MOB\_TERM<sub>s</sub>, for each active MIN. The mobile station shall set MOB\_TERM<sub>s</sub> to YES if any of the following conditions is met for the MIN; otherwise MOB\_TERM<sub>s</sub> shall be set to NO:

- The MIN is not roaming, and MOB\_TERM\_HOME<sub>p</sub> is equal to '1'; or
- The MIN is a foreign NID roamer and MOB\_TERM\_FOR\_NID<sub>p</sub> is equal to '1'; or
- The MIN is a foreign SID roamer and MOB\_TERM\_FOR\_SID<sub>p</sub> is equal to '1'.

The mobile station shall store a registration status indicator, MIN\_REG\_ENABLED<sub>s</sub>, for each active MIN. The indicator MIN\_REG\_ENABLED<sub>s</sub> for a MIN shall be set to YES if any of the following conditions is met for the MIN; otherwise MIN\_REG\_ENABLED<sub>s</sub> shall be set to NO:

- The MIN is not roaming, and both HOME\_REG<sub>s</sub> and MOB\_TERM\_HOME<sub>p</sub> are equal to '1'; or

---

<sup>28</sup>For example, suppose a mobile station has the following SID, NID list (2, 3) (2, 0) (3, 1). If the base station (SID, NID) pair is (2, 3) then the mobile station is not roaming because the (SID, NID) pair is in the list. If the base station (SID, NID) pair is (2, 7) then the mobile station is a foreign NID roamer because the SID 2 is in the list, but the (SID, NID) pair (2, 7) is not in the list. If the base station (SID, NID) pair is (4, 0) then the mobile station is a foreign SID roamer because SID 4 is not in the list.

- 1       • The MIN is a foreign NID roamer and both FOR\_NID\_REG<sub>s</sub> and MOB\_TERM\_FOR-  
2       \_NID<sub>p</sub> are equal to '1'; or
- 3       • The MIN is a foreign SID roamer and both FOR\_SID\_REG<sub>s</sub> and MOB\_TERM\_FOR-  
4       \_SID<sub>p</sub> are equal to '1'.

5       The mobile station performs class C registrations if MIN\_REG\_ENABLED<sub>s</sub> is YES for any of  
6       the mobile station's active MINs.

7       The mobile station shall store the indicator C\_REG\_ENABLED<sub>s</sub>. The mobile station shall  
8       set C\_REG\_ENABLED<sub>s</sub> to YES if MIN\_REG\_ENABLED<sub>s</sub> is YES for any active MIN.

#### 9       6.6.5.4 Registration Messages

10      The mobile station sends two types of registration messages to the base station: the *Initial*  
11      *Registration Message* and the *Registration Update Message*. The *Initial Registration Message*  
12      is sent when performing an initial registration. An initial registration is performed  
13      whenever it is necessary to inform the base station of the complete configuration of the  
14      mobile station. Any registration that is not an initial registration is a registration update.  
15      The *Registration Update Message* is sent for a registration update, such as when the mobile  
16      station adds or deletes a MIN or registers without changing the list of MINs. The  
17      *Registration Update Message* is also sent as a continuation of an initial registration when  
18      the complete list of MINs does not fit into a single *Initial Registration Message*.

19      The first registration sent after power-up or after the serving system is changed shall be an  
20      initial registration.

21      When the mobile station performs an initial registration, all active MINs shall be included in  
22      the registration. The first registration message sent shall be an *Initial Registration Message*.  
23      If the mobile station cannot fit the entire set of MINs into the *Initial Registration Message*, it  
24      shall send the *Initial Registration Message*, followed by one or more *Registration Update*  
25      *Messages* with the additional MINs. If an initial registration is incomplete (i.e., if not all  
26      MINs are registered), the next registration performed by the mobile station, if not a power-  
27      down registration, shall also be an initial registration

28      When the mobile station performs a registration update, it shall send a *Registration Update*  
29      *Message*. If the mobile station adds or deletes multiple MINs and cannot fit the entire set of  
30      MIN changes into one *Registration Update Message*, it shall send additional *Registration*  
31      *Update Messages* as needed.

#### 32      6.6.5.5 Registration Timers and Indicators

33      The mobile station shall provide the following registration timers:

- 34       • Power-up/initialization timer (see 6.6.5.1.1).
- 35       • Timer-based registration timer (see 6.6.5.1.3).
- 36       • Zone list entry timers (see 6.6.5.1.5).
- 37       • SID/NID list entry timers (see 6.6.5.1.5).

1 The mobile station shall provide a means of enabling and disabling each timer. When a  
2 timer is disabled, it shall not be considered expired. A timer that has been enabled is  
3 referred to as active.

#### 4 6.6.5.6 Registration Procedures

##### 5 6.6.5.6.1 Actions in the *Mobile Station Initialization State*

###### 6 6.6.5.6.1.1 Power-up or Serving System Change

7 Upon power-up, the mobile station shall perform the following actions:

- 8 • Delete all entries of ZONE\_LIST<sub>S</sub>.
- 9 • If ZONE\_LIST<sub>S-p</sub> contains an entry, copy the entry to ZONE\_LIST<sub>S</sub> and disable the  
10 corresponding entry timer.
- 11 • Delete all entries of SID\_NID\_LIST<sub>S</sub>.
- 12 • If SID\_NID\_LIST<sub>S-p</sub> contains an entry, copy the entry to SID\_NID\_LIST<sub>S</sub> and disable  
13 the corresponding entry timer.

14 Upon power-up or after switching from analog or the alternate CDMA serving system, the  
15 mobile station shall perform the following actions:

- 16 • Set timer-based registration enable status (COUNTER\_ENABLED<sub>S</sub>) to NO.
- 17 • Set class C registration enable status (C\_REG\_ENABLED<sub>S</sub>) to NO.
- 18 • Disable all registration timers (see 6.6.5.5).

###### 19 6.6.5.6.1.2 Timer Maintenance

20 While in the *Mobile Station Initialization State*, the mobile station shall update all active  
21 registration timers (see 6.6.5.5). If any timer expires while in this state, the mobile station  
22 shall preserve the expiration status so that further action can be taken in the *Mobile Station*  
23 *Idle State*.

###### 24 6.6.5.6.1.3 Entering the *Mobile Station Idle State*

25 Before entering the *Mobile Station Idle State*, the mobile station shall perform the following  
26 actions:

- 27 • Set the stored message sequence numbers CONFIG\_MSG\_SEQ<sub>S</sub>, SYS\_PAR\_MSG-  
28 \_SEQ<sub>S</sub>, NGHBR\_LST\_MSG\_SEQ<sub>S</sub>, CHAN\_LST\_MSG\_SEQ<sub>S</sub>, and ACC\_MSG\_SEQ<sub>S</sub>  
29 variables to NULL (see 6.6.2.2).
- 30 • If SID\_NID\_LIST<sub>S</sub> is empty, enable the power-up/initialization timer with an  
31 expiration time of T<sub>57m</sub> seconds (see 6.6.5.1.1).

###### 32 6.6.5.6.2 Actions in the *Mobile Station Idle State*

33 Requirements in this section and its subsections apply only when the mobile station is in  
34 the *Mobile Station Idle State*.

#### 6.6.5.6.2.1 Idle Registration Procedures

These procedures are performed whenever the mobile station is in the *Mobile Station Idle State* (see 6.6.2.1.3).

While in the *Mobile Station Idle State*, the mobile station shall update all active registration timers (see 6.6.5.5).

If the power-up/initialization timer has expired or is disabled, the mobile station shall perform the following actions in the order given; except that if any action causes a registration to be performed, the remaining actions, if any, shall not be performed and the mobile station shall enter the *Update Overhead Information Substate* of the *System Access State* (see 6.6.3) with a registration indication.

1. The timer-based registration timer shall be enabled ( $COUNTER\_ENABLED_S = YES$ ) and the timer count ( $REG\_COUNT_S$ ) shall be set to a pseudorandom number as specified in 6.6.5.1.3, if the following conditions are met:
  - a.  $COUNTER\_ENABLED_S$  is equal to NO; and
  - b. The stored configuration parameters are current (see 6.6.2.2); and
  - c.  $C\_REG\_ENABLED_S$  is equal to YES; and
  - d.  $REG\_PRD_S$  is not equal to zero.
2. If any zone list entry timer (see 6.6.5.1.5) has expired, the mobile station shall delete the corresponding entry from  $ZONE\_LIST_S$ .
3. If any SID/NID list entry timer (see 6.6.5.1.5) has expired, the mobile station shall delete the corresponding entry from  $SID\_NID\_LIST_S$ .
4. The mobile station shall perform power-up registration, as specified in 6.6.5.1.1, if all the following conditions are met:
  - a.  $POWER\_UP\_REG_S$  is equal to '1'; and
  - b. The stored configuration parameters are current (see 6.6.2.2); and
  - c.  $SID\_NID\_LIST_S$  is empty; and
  - d.  $C\_REG\_ENABLED_S$  is equal to YES.
5. The mobile station shall perform parameter-change registration (see 6.6.5.1.6) if all the following conditions are met:
  - a.  $PARAMETER\_REG_S$  is equal to '1'; and
  - b. The stored configuration parameters are current (see 6.6.2.2); and
  - c. There is no entry of  $SID\_NID\_LIST_S$  whose SID and NID fields match the stored  $SID_S$  and  $NID_S$ .
6. The mobile station shall perform timer-based registration (see 6.6.5.1.3) if all the following conditions are met:
  - a.  $COUNTER\_ENABLED_S$  is equal to YES; and

- b. The stored configuration parameters are current (see 6.6.2.2); and
  - c. C\_REG\_ENABLED<sub>S</sub> is equal to YES; and
  - d. REG\_COUNT<sub>S</sub> is greater than or equal to REG\_COUNT\_MAX<sub>S</sub>.
7. The mobile station shall perform distance-based registration (see 6.6.5.1.4) if all the following conditions are met:
  - a. REG\_DIST<sub>S</sub> is not equal to zero; and
  - b. The stored configuration parameters are current (see 6.6.2.2); and
  - c. C\_REG\_ENABLED<sub>S</sub> is equal to YES; and
  - d. The current base station's distance from the base station in which the mobile station last registered (see 6.6.5.1.4) is greater than or equal to REG\_DIST\_REG<sub>S-p</sub>.
8. The mobile station shall perform zone-based registration (see 6.6.5.1.5) if all the following conditions are met:
  - a. TOTAL\_ZONES<sub>S</sub> is not equal to zero; and
  - b. The stored configuration parameters are current (see 6.6.2.2); and
  - c. C\_REG\_ENABLED<sub>S</sub> is equal to YES; and
  - d. There is no entry of ZONE\_LIST<sub>S</sub> whose SID, NID and REG\_ZONE fields match the stored SID<sub>S</sub>, NID<sub>S</sub> and REG\_ZONE<sub>S</sub>.

#### 6.6.5.6.2.2 Processing the Registration Fields of the *System Parameters Message*

When the mobile station processes the *System Parameters Message*, it shall perform the following actions:

1. If REG\_PRD<sub>S</sub> is equal to zero, the mobile station shall set COUNTER\_ENABLED<sub>S</sub> to NO.
2. If REG\_PRD<sub>S</sub> is not equal to zero, the mobile station shall set REG\_COUNT\_MAX<sub>S</sub> as specified in 6.6.5.1.3.
3. The mobile station shall update MIN roaming status and set C\_REG\_ENABLED<sub>S</sub> as specified in 6.6.5.3.
4. If ZONE\_LIST<sub>S</sub> contains more than TOTAL\_ZONES<sub>S</sub> entries, the mobile station shall delete the excess entries according to the rules specified in 6.6.5.1.5.

#### 6.6.5.6.2.3 Ordered Registration

Ordered registration is performed after receiving a *Registration Request Order* while in the *Mobile Station Order and Message Processing Operation* (see 6.6.2.4).

If the ORDQ field is '00000001', then the mobile station shall perform an initial registration (see 6.6.5.4). If the ORDQ field is '00000010', then the mobile station shall perform a registration update (see 6.6.5.4). The mobile station shall enter the *Update Overhead*



1 *Information Substate* of the *System Access State* with a registration indication within  $T_{33m}$   
 2 seconds after the *Registration Request Order* is received.

#### 3 6.6.5.6.2.4 Power Down

4 These procedures are performed when the mobile station is directed by the user to power  
 5 down.

6 If  $POWER\_UP\_REG_S$  is equal to '0', the mobile station shall perform the following actions:

- 7 • If an entry of  $ZONE\_LIST_S$  does not have an active timer, copy that entry to  
 8  $ZONE\_LIST_{S-p}$ ; otherwise, delete any entry in  $ZONE\_LIST_{S-p}$ .
- 9 • If an entry of  $SID\_NID\_LIST_S$  does not have an active timer, copy that entry to  
 10  $SID\_NID\_LIST_{S-p}$ ; otherwise, delete any entry in  $SID\_NID\_LIST_{S-p}$ .

11 If  $POWER\_UP\_REG_S$  is equal to '1', the mobile station shall delete all entries from  
 12  $ZONE\_LIST_{S-p}$  and  $SID\_NID\_LIST_{S-p}$ .

13 The mobile station shall perform power-down registration, as specified in 6.6.5.1.2, if all the  
 14 following conditions are met:

- 15 •  $C\_REG\_ENABLED_S$  equals YES; and
- 16 •  $POWER\_DOWN\_REG_S$  equals '1'; and
- 17 • There is an entry of  $SID\_NID\_LIST_S$  for which the SID and NID fields are equal to  
 18  $SID_S$  and  $NID_S$ ; and
- 19 • The power-up/initialization timer (see 6.6.5.1.1) is disabled or has expired.

#### 20 6.6.5.6.3 Actions in the *System Access State*

21 Requirements in this section and its subsections apply only when the mobile station is in  
 22 the *System Access State*.

##### 23 6.6.5.6.3.1 Successful Access

24 These procedures are performed after the mobile station receives an acknowledgement for a  
 25 probe sent on the Access Channel (see 6.6.3.1.2).

26 The mobile station shall perform the following actions:

- 27 • Disable the power-up/initialization timer (see 6.6.5.1.1).
- 28 • Set the First-Idle ID status to enabled (see 2.6.1.1).
- 29 • Set  $REG\_COUNT_S$  to zero.
- 30 • Add  $REG\_ZONE_S$ ,  $SID_S$ , and  $NID_S$  to  $ZONE\_LIST_S$  if not already in the list.
- 31 • Disable the zone list entry timer for the entry of  $ZONE\_LIST_S$  containing  $REG\_ZONE_S$ ,  
 32  $SID_S$ , and  $NID_S$ . For any other entry of  $ZONE\_LIST_S$  whose entry timer is not active,  
 33 enable the entry timer with the duration specified by  $ZONE\_TIMER_S$  (see 6.6.5.1.5).
- 34 • If  $ZONE\_LIST_S$  contains more than  $TOTAL\_ZONES_S$  entries, delete the excess entries  
 35 according to the rules specified in 6.6.5.1.5.

- 1 • Add  $SID_S$  and  $NID_S$  to  $SID\_NID\_LIST_S$  if not already in the list.
- 2 • Disable the  $SID/NID$  list entry timer for the entry of  $SID\_NID\_LIST_S$  containing  $SID_S$ ,
- 3 and  $NID_S$ . For any other entry of  $SID\_NID\_LIST_S$  whose entry timer is not active,
- 4 enable the entry timer with the duration specified in 6.6.5.1.5.
- 5 • If  $SID\_NID\_LIST_S$  contains more than  $N_{10m}$  entries, the mobile station may delete the
- 6 excess entries according to the rules specified in 6.6.5.1.5.
- 7 • Set the stored location of last registration ( $BASE\_LAT\_REG_{S-p}$  and  $BASE\_LONG\_REG_{S-p}$ ) to the current base station's location ( $BASE\_LAT_S$  and  $BASE\_LONG_S$ ). Set
- 8 the stored registration distance ( $REG\_DIST\_REG_{S-p}$ ) to the current base station's
- 9 registration distance ( $REG\_DIST_S$ ).
- 10 • Update MIN roaming status and set  $C\_REG\_ENABLED_S$  and  $MOB\_TERM_S$  as
- 11 specified in 6.6.5.3.
- 12

#### 13 6.6.5.6.3.2 Unsuccessful Access

14 These procedures are performed when an access attempt fails.

15 The mobile station shall perform the following actions:

- 16 • If there is an entry of  $ZONE\_LIST_S$  whose entry timer is not active, enable the entry
- 17 timer with the duration specified by  $ZONE\_TIMER_S$  (see 6.6.5.1.5).
- 18 • If there is an entry of  $SID\_NID\_LIST_S$  whose entry timer is not active, enable the entry
- 19 timer with the duration specified in 6.6.5.1.5.

#### 20 6.6.5.6.3.3 Power Down

21 These procedures are performed when the mobile station is directed by the user to power

22 down.

23 If  $POWER\_UP\_REG_S$  is equal to '0', the mobile station shall perform the following actions:

- 24 • If an entry of  $ZONE\_LIST_S$  does not have an active timer, copy that entry to
- 25  $ZONE\_LIST_{S-p}$ ; otherwise, delete any entry in  $ZONE\_LIST_{S-p}$ .
- 26 • If an entry of  $SID\_NID\_LIST_S$  does not have an active timer, copy that entry to
- 27  $SID\_NID\_LIST_{S-p}$ ; otherwise, delete any entry in  $SID\_NID\_LIST_{S-p}$ .

28 If  $POWER\_UP\_REG_S$  is equal to '1', the mobile station shall delete all entries from

29  $ZONE\_LIST_{S-p}$  and  $SID\_NID\_LIST_{S-p}$ .

#### 30 6.6.5.6.4 Actions in the *Mobile Station Control on the Traffic Channel State*

31 Requirements in this section and its subsections apply only when the mobile station is in

32 the *Mobile Station Control on the Traffic Channel State*.

##### 33 6.6.5.6.4.1 Call Initiation

34 Upon entering the *Mobile Station Control on the Traffic Channel State*, the mobile station

35 shall set  $COUNTER\_ENABLED_S$  to NO.

#### 6.6.5.6.4.2 Timer Maintenance

While in the *Mobile Station Control on the Traffic Channel State*, the mobile station shall update all active registration timers.

If a zone list entry timer expires, the mobile station shall delete the corresponding entry from  $ZONE\_LIST_S$ . If a SID/NID list entry timer expires, the mobile station shall delete the corresponding entry from  $SID\_NID\_LIST_S$ .

#### 6.6.5.6.4.3 Processing the *Mobile Station Registered Message*

The mobile station receives the *Mobile Station Registered Message* on the Forward Traffic Channel when the mobile station is considered registered for the base station whose location and other parameters are included in the message.

The mobile station shall store the following parameters:

- System identification ( $SID_S = SID_R$ )
- Network identification ( $NID_S = NID_R$ )
- Registration zone ( $REG\_ZONE_S = REG\_ZONE_R$ )
- Number of registration zones to be retained ( $TOTAL\_ZONES_S = TOTAL\_ZONES_R$ )
- Zone timer length ( $ZONE\_TIMER_S = ZONE\_TIMER_R$ )
- Base station latitude ( $BASE\_LAT_S = BASE\_LAT_R$ )
- Base station longitude ( $BASE\_LONG_S = BASE\_LONG_R$ )
- Registration distance ( $REG\_DIST_S = REG\_DIST_R$ )

The mobile station shall perform the following actions:

- Set the First-Idle ID status to enabled (see 2.6.2.1).
- Add  $REG\_ZONE_S$ ,  $SID_S$ , and  $NID_S$  to  $ZONE\_LIST_S$  if not already in the list.
- Disable the zone list entry timer for the entry of  $ZONE\_LIST_S$  containing  $REG\_ZONE_S$ ,  $SID_S$ , and  $NID_S$ . For any other entry of  $ZONE\_LIST_S$  whose entry timer is not active, enable the entry timer with the duration specified by  $ZONE\_TIMER_S$  (see 6.6.5.1.5).
- If  $ZONE\_LIST_S$  contains more than  $TOTAL\_ZONES_S$  entries, delete the excess entries according to the rules specified in 6.6.5.1.5.
- Add  $SID_S$  and  $NID_S$  to  $SID\_NID\_LIST_S$  if not already in the list.
- Disable the SID/NID list entry timer for the entry of  $SID\_NID\_LIST_S$  containing  $SID_S$ , and  $NID_S$ . For any other entry of  $SID\_NID\_LIST_S$  whose entry timer is not active, enable the entry timer with the duration specified in 6.6.5.1.5.
- If  $SID\_NID\_LIST_S$  contains more than  $N_{10m}$  entries, the mobile station may delete the excess entries according to the rules specified in 6.6.5.1.5.

- Set the stored location of last registration (BASE\_LAT\_REG<sub>S-P</sub> and BASE\_LONG\_REG<sub>S-P</sub>) to the base station's location (BASE\_LAT<sub>S</sub> and BASE\_LONG<sub>S</sub>). Set the stored registration distance (REG\_DIST\_REG<sub>S-P</sub>) to the base station's registration distance (REG\_DIST<sub>S</sub>).
- Update MIN roaming status and set MOB\_TERM<sub>S</sub> as specified in 6.6.5.3.

#### 6.6.5.6.4.4 Power Down

These procedures are performed when the mobile station is directed by the user to power down.

If POWER\_UP\_REG<sub>S</sub> is equal to '0', the mobile station shall perform the following actions:

- If an entry of ZONE\_LIST<sub>S</sub> does not have an active timer, copy that entry to ZONE\_LIST<sub>S-P</sub>; otherwise, delete any entry in ZONE\_LIST<sub>S-P</sub>.
- If an entry of SID\_NID\_LIST<sub>S</sub> does not have an active timer, copy that entry to SID\_NID\_LIST<sub>S-P</sub>; otherwise, delete any entry in SID\_NID\_LIST<sub>S-P</sub>.

If POWER\_UP\_REG<sub>S</sub> is equal to '1', the mobile station shall delete all entries from ZONE\_LIST<sub>S-P</sub> and SID\_NID\_LIST<sub>S-P</sub>.

### 6.6.6 Handoff Procedures

This section presents an overview and mobile station requirements for handoffs occurring while the mobile station is in the *Mobile Station Control on the Traffic Channel State* (see 6.6.4). Mobile station requirements for handoffs occurring while the mobile station is in the *Mobile Station Idle State* are specified in 6.6.2.1.4.

#### 6.6.6.1 Overview

##### 6.6.6.1.1 Types of Handoff

The mobile station supports the following three handoff procedures while in the *Mobile Station Control on the Traffic Channel State*:

- *Soft Handoff*: A handoff in which the mobile station commences communications with a new base station without interrupting communications with the old base station. Soft handoff can only be used between CDMA Channels having identical frequency assignments. Soft handoff provides diversity of Forward Traffic Channels and Reverse Traffic Channel paths on the boundaries between base stations.
- *CDMA to CDMA Hard Handoff*: A handoff in which the mobile station is transitioned between disjoint sets of base stations, different frequency assignments, or different frame offsets.
- *CDMA to Analog Handoff*: A handoff in which the mobile station is directed from a Forward Traffic Channel to an analog voice channel.

#### 6.6.6.1.2 Pilot Sets

In the following, the term pilot refers to a Pilot Channel identified by a pilot sequence offset (see 7.1.3.2.1) and a frequency assignment (see 7.1.1.1). A pilot is associated with the Forward Traffic Channels in the same Forward CDMA Channel.

Soft handoffs and CDMA to CDMA hard handoffs using the same frequency assignment are typically initiated by the mobile station. The mobile station searches for pilots to detect the presence of CDMA Channels and to measure their strengths. When the mobile station detects a pilot of sufficient strength that is not associated with any of the Forward Traffic Channels assigned to it, it sends a *Pilot Strength Measurement Message* to the base station. The base station can then assign a Forward Traffic Channel associated with that pilot to the mobile station and direct the mobile station to perform a handoff.

The pilot search parameters and the rules for *Pilot Strength Measurement Message* transmission are expressed in terms of the following sets of pilots:

- *Active Set*: The pilots associated with the Forward Traffic Channels assigned to the mobile station.
- *Candidate Set*: The pilots that are not currently in the Active Set but have been received by the mobile station with sufficient strength to indicate that the associated Forward Traffic Channels could be successfully demodulated.
- *Neighbor Set*: The pilots that are not currently in the Active Set or the Candidate Set but are likely candidates for handoff.
- *Remaining Set*: The set of all possible pilots in the current system on the current CDMA frequency assignment, excluding the pilots in the Neighbor Set, the Candidate Set, and the Active Set.

#### 6.6.6.2 Requirements

##### 6.6.6.2.1 Pilot Search

The base station specifies for each of the above pilot sets the search window (range of PN offsets) in which the mobile station is to search for usable multipath components (i.e., multipath components that the mobile station can use for demodulation of the associated Forward Traffic Channel) of the pilots in the set.

Search performance criteria are defined in the “Recommended Minimum Performance Standards for 800 MHz Wideband Spread Spectrum Dual-Mode Mobile Stations.”

This search shall be governed by the following:

- Active Set and Candidate Set: The search procedures for pilots in the Active Set and Candidate Set shall be identical. The search window size<sup>29</sup> for each pilot in the Active Set and Candidate Set shall be the number of PN chips specified in Table 6.6.6.2.1-1 corresponding to SRCH\_WIN\_A<sub>s</sub>. The mobile station should center the search window for each pilot of the Active Set and Candidate Set around the earliest arriving usable multipath component of the pilot.

**Table 6.6.6.2.1-1. Searcher Window Sizes**

SRCH_WIN_A SRCH_WIN_N SRCH_WIN_R	Window Size (PN chips)	SRCH_WIN_A SRCH_WIN_N SRCH_WIN_R	Window Size (PN chips)
0	2	8	40
1	4	9	56
2	6	10	80
3	8	11	114
4	10	12	160
5	14	13	226
6	20	14	320
7	28	15	452

- Neighbor Set: The search window size for each pilot in the Neighbor Set shall be the number of PN chips specified in Table 6.6.6.2.1-1 corresponding to SRCH\_WIN\_N<sub>s</sub>. The mobile station should center the search window for each pilot in the Neighbor Set around the pilot's PN sequence offset using timing defined by the mobile station's time reference (see 6.1.5.1).
- Remaining Set: The search window size for each pilot in the Remaining Set shall be the number of PN chips specified in Table 6.6.6.2.1-1 corresponding to SRCH\_WIN\_R<sub>s</sub>. The mobile station should center the search window for each pilot in the Remaining Set around the pilot's PN sequence offset using timing defined by the mobile station's time reference (see 6.1.5.1).

<sup>29</sup>The table defines the entire search range. For example, SRCH\_WIN\_A<sub>s</sub> = 7 corresponds to a 28 PN chip search window or  $\pm 14$  PN chips around the search window center.

#### 6.6.6.2.2 Pilot Strength Measurements

The mobile station assists the base station in the handoff process by measuring and reporting the strengths of received pilots.

The mobile station shall compute the strength of a pilot by adding the ratios of received pilot energy per chip,  $E_c$ , to total received spectral density (noise and signals),  $I_0$ , of at most  $k$  usable multipath components, where  $k$  is the number of demodulating elements supported by the mobile station.

#### 6.6.6.2.3 Handoff Drop Timer

The mobile station shall maintain a handoff drop timer for each pilot in the Active Set and Candidate Set. The mobile station shall start the timer whenever the strength of the corresponding pilot becomes less than  $T\_DROP_s$ . The mobile station shall reset and disable the timer if the strength of the corresponding pilot exceeds  $T\_DROP_s$ . If  $T\_TDROP_s$  equals zero, the mobile station shall consider the timer expired within 100 ms of enabling it. Otherwise, the mobile station shall consider the timer expired within 10% of the timer expiration value shown in Table 6.6.6.2.3.-1 corresponding to  $T\_TDROP_s$ . If  $T\_TDROP_s$  changes, the mobile station shall begin using the new value within 100 ms.

**Table 6.6.6.2.3-1. Handoff Drop Timer Expiration Values**

<b>T_TDROP</b>	<b>Timer Expiration (seconds)</b>	<b>T_TDROP</b>	<b>Timer Expiration (seconds)</b>
0	0	8	27
1	1	9	39
2	2	10	55
3	4	11	79
4	6	12	112
5	9	13	159
6	13	14	225
7	19	15	319

#### 6.6.6.2.4 Pilot PN Phase

The mobile station shall measure the arrival time,  $PILOT\_ARRIVAL$ , for each pilot reported to the base station. The pilot arrival time shall be the time of occurrence, as measured at the mobile station antenna connector, of the earliest arriving usable multipath component of the pilot. The arrival time shall be measured relative to the mobile station's time reference (see 6.1.5.1) in units of PN chips. The mobile station shall compute the reported pilot PN phase,  $PILOT\_PN\_PHASE$ , as

$$PILOT\_PN\_PHASE = (PILOT\_ARRIVAL + (64 \times PILOT\_PN)) \bmod 2^{15},$$

where  $PILOT\_PN$  is the PN sequence offset index of the pilot (see 7.1.3.2.1).

#### 6.6.6.2.5 Handoff Messages

##### 6.6.6.2.5.1 Processing of Forward Traffic Channel Handoff Messages

If the mobile station receives any of the following messages, then the mobile station shall process the message as described.

1. Pilot Measurement Request Order: The mobile station shall send, within  $T_{56m}$  seconds, a *Pilot Strength Measurement Message*.
2. Handoff Direction Message: The message shall take effect at the following time:
  - If  $FRAME\_OFFSET_r$  is not equal to  $FRAME\_OFFSET_s$  and  $USE\_TIME_r$  equals '0', then the mobile station shall process the message at the first 80 ms boundary (relative to System Time) occurring at least 80 ms after the end of the frame containing the last bit of the message.
  - Otherwise, the message shall take effect at the action time of the message as specified in 6.6.4.1.5.

When the message takes effect, the mobile station shall perform the following:

- Update the Active Set in accordance with the *Handoff Direction Message* (see 6.6.6.2.6.1).
- Discontinue use of all Forward Traffic Channels associated with pilots not listed in the *Handoff Direction Message*.
- If  $FRAME\_OFFSET_r$  is not equal to  $FRAME\_OFFSET_s$ , change the frame offset on both the Forward Traffic Channel and the Reverse Traffic Channel.
- If the  $RESET\_L2_r$  is equal to '1', reset the acknowledgement procedures as specified in 6.6.4.1.3.3, and reset the Forward Traffic Channel power control counters as specified in 6.6.4.1.1.1.
- Use the long code mask specified by the  $PRIVATE\_LCM_r$  (see 6.3.12.3).
- Process the  $ENCRYPT\_MODE$  field as specified in 6.3.12.2.
- Store the following parameters from the *Handoff Direction Message*:
  - *Handoff Direction Message* sequence number ( $HDM\_SEQ_s = HDM\_SEQ_r$ )



- 1           • Pilot detection threshold ( $T_{ADD_S} = T_{ADD_T}$ )
- 2           • Pilot drop threshold ( $T_{DROP_S} = T_{DROP_T}$ )
- 3           • Active Set versus Candidate Set comparison threshold ( $T_{COMP_S} = T_{COMP_T}$ )
- 4           • Drop timer value ( $T_{TDROP_S} = T_{TDROP_T}$ )
- 5           • Frame offset ( $FRAME\_OFFSET_S = FRAME\_OFFSET_T$ )
- 6       3. Analog Handoff Direction Message: The mobile station shall process the message as
- 7           specified in 6.6.6.2.9.
- 8       4. Neighbor List Update Message: The mobile station shall process the message as
- 9           specified in 6.6.6.2.6.3.

#### 10   6.6.6.2.5.2 Processing of Reverse Traffic Channel Handoff Messages

11   The mobile station sends the following messages on the Reverse Traffic Channel in support  
12   of handoff when its transmitter is enabled and following the receipt of the first *Base Station*  
13   *Acknowledgement Order* on the Forward Traffic Channel:

- 14       1. Pilot Strength Measurement Message: The mobile station shall send an autonomous
- 15           *Pilot Strength Measurement Message* whenever any of the following events occur:
  - 16           • The strength of a Candidate Set, Neighbor Set, or Remaining Set pilot is found to
  - 17           be above  $T_{ADD_S}$  and a *Pilot Strength Measurement Message* carrying this
  - 18           information has not been sent since the last *Handoff Direction Message* was
  - 19           received.
  - 20           • The strength of a Candidate Set pilot exceeds the strength of an Active Set pilot
  - 21           by  $T_{COMP_S}$  dB and a *Pilot Strength Measurement Message* carrying this
  - 22           information has not been sent since the last *Handoff Direction Message* was
  - 23           received.
  - 24           • The handoff drop timer of an Active Set pilot has expired and a *Pilot Strength*
  - 25           *Measurement Message* carrying this information has not been sent since the last
  - 26           *Handoff Direction Message* was received.
- 27       2. Handoff Completion Message: The mobile station shall send the *Handoff*
- 28           *Completion Message* within  $T_{56m}$  seconds of the action time of a received *Handoff*
- 29           *Direction Message*.

#### 30   6.6.6.2.6 Set Maintenance

##### 31   6.6.6.2.6.1 Maintenance of the Active Set

32   The mobile station shall support an Active Set size of at least  $N_{6m}$  pilots.

33   When the mobile station is first assigned a Forward Traffic Channel, the mobile station  
34   shall initialize the Active Set to contain only the pilot associated with the assigned Forward  
35   Traffic Channel. When the mobile station processes a *Handoff Direction Message* it shall  
36   replace the Active Set with the pilots listed in the message.

#### 6.6.6.2.6.2 Maintenance of the Candidate Set

The mobile station shall support a Candidate Set size of at least  $N_{7m}$  pilots.

When the mobile station is first assigned a Forward Traffic Channel, the mobile station shall initialize the Candidate Set to contain no pilots. The mobile station shall adjust the Candidate Set whenever any of the following events occur:

- If the mobile station detects that the strength of a Neighbor Set pilot or a Remaining Set pilot exceeds  $T\_ADD_s$ , the mobile station shall add the pilot to the Candidate Set.
- If the mobile station processes a *Handoff Direction Message* which does not list a pilot in the current Active Set, and the handoff drop timer corresponding to that pilot has not expired, the mobile station shall add the pilot to the Candidate Set.
- If the mobile station processes a *Handoff Direction Message* which lists a pilot in the current Candidate Set, the mobile station shall delete the pilot from the Candidate Set.
- If the handoff drop timer corresponding to a Candidate Set pilot expires, the mobile station shall delete the pilot from the Candidate Set.
- If the mobile station adds a pilot to the Candidate Set and the resulting Candidate Set size exceeds the size supported by the mobile station, the mobile station shall delete from the Candidate Set the pilot whose handoff drop timer is closest to expiration. If more than one such pilot exists, the mobile station shall delete one such pilot that has the lowest strength. If no pilot in the Candidate Set has an enabled handoff drop timer, the mobile station shall delete from the Candidate Set one of the pilots that has the lowest strength.

#### 6.6.6.2.6.3 Maintenance of the Neighbor Set

The mobile station shall support a Neighbor Set size of at least  $N_{8m}$  pilots.

When the mobile station is first assigned a Forward Traffic Channel, the mobile station shall initialize the Neighbor Set to contain the pilots specified in the most recently received *Neighbor List Message*.

The mobile station shall maintain a counter,  $AGE_s$ , for each pilot in the Neighbor Set. The mobile station shall initialize this counter to zero when it moves the pilot from the Active Set or the Candidate Set to the Neighbor Set. The mobile station shall initialize this counter to  $NGHBR\_MAX\_AGE_s$  when it moves the pilot from the Remaining Set to the Neighbor Set. The mobile station shall increment  $AGE_s$  for each pilot in the Neighbor Set upon receipt of a *Neighbor List Update Message*.

The mobile station shall adjust the Neighbor Set whenever any of the following events occur:

- If the mobile station receives a *Neighbor List Update Message*, it shall perform the following:
  - Increment  $AGE_s$  for each pilot in the Neighbor Set.
  - Delete from the Neighbor Set all pilots whose  $AGE_s$  exceeds  $NGHBR\_MAX\_AGE_s$ .

- Add to the Neighbor Set each pilot named in the message, if it is not already a pilot of the Candidate Set or Neighbor Set. If the mobile station can store in the Neighbor Set only  $k$  additional pilots and more than  $k$  new pilots were sent in the *Neighbor List Update Message*, the mobile station shall store the first  $k$  new pilots listed in the message.
- If the handoff drop timer of a pilot in the Candidate Set expires, the mobile station shall add the pilot to the Neighbor Set.
- If the mobile station processes a *Handoff Direction Message* in which a pilot in the Active Set is not listed and the handoff drop timer corresponding to the pilot has expired, the mobile station shall add the pilot to the Neighbor Set.
- If the mobile station adds a pilot to the Candidate Set and the resulting Candidate Set size exceeds the size supported by the mobile station, the mobile station shall add the deleted Candidate Set pilot to the Neighbor Set (see 6.6.6.2.6.2).
- If the mobile station detects that the strength of a Neighbor Set pilot exceeds  $T_{ADD_S}$ , the mobile station shall delete the pilot from the Neighbor Set.
- If the mobile station processes a *Handoff Direction Message* which lists a pilot in the current Neighbor Set, the mobile station shall delete the pilot from the Neighbor Set.
- If the mobile station adds a pilot to the Neighbor Set and the resulting Neighbor Set size exceeds the size supported by the mobile station, the mobile station shall delete from the Neighbor Set the pilot whose  $AGE_S$  is largest. If more than one such pilot exists, the mobile station shall delete one such pilot that has the lowest strength.

#### 6.6.6.2.7 Soft Handoff

##### 6.6.6.2.7.1 Forward Traffic Channel Processing

All Forward Traffic Channels associated with pilots in the Active Set of the mobile station carry identical modulation symbols with the exception of the power control subchannel (see 7.1.3.1.7 and 7.6.6.2.4.2).

When the Active Set contains more than one pilot, the mobile station should provide diversity combining of the associated Forward Traffic Channels. The mobile station shall provide for differential propagation delays from zero to at least 150  $\mu s$ .

##### 6.6.6.2.7.2 Reverse Traffic Channel Power Control During Soft Handoff

The *Handoff Direction Message* identifies sets of Forward Traffic Channels that carry identical closed loop power control subchannels.

In each power control group containing valid power control bits (see 6.1.2.3.2), the mobile station should provide diversity combining of the identical closed loop power control subchannels and shall obtain at most one power control bit from each set of identical closed loop power control subchannels. If the power control bits obtained from all sets are equal to '0', the mobile station shall increase its power as specified in 6.1.2.3.2. If the power control bit obtained from any set is equal to '1', the mobile station shall decrease its power as specified in 6.1.2.3.2.

### 6.6.6.2.7.3 Timing During Soft Handoff

The mobile station shall comply with the requirements specified in 6.1.5.1 during soft handoff.

### 6.6.6.2.8 CDMA to CDMA Hard Handoff

When the mobile station processes a *Handoff Direction Message* specifying a CDMA to CDMA hard handoff, it shall disable its transmitter, reset the fade timer specified in 6.4.4, and tune to the assigned Forward Traffic Channel. The mobile station shall not enable its transmitter until it receives at least  $N_{3m}$  consecutive good frames on the assigned Forward Traffic Channel.

If the *Handoff Direction Message* specifies a CDMA frequency assignment different from the current CDMA frequency assignment and an Active Set containing pilots with pilot PN sequence offsets identical to those of the pilots in the current Active Set, the mobile station shall begin monitoring the assigned Forward Traffic Channel within  $T_{60m}$  seconds.

If the *Handoff Direction Message* specifies a CDMA frequency assignment different from the current CDMA frequency assignment and an Active Set containing a pilot with pilot PN sequence offset not equal to that of any pilot in the current Active Set, the mobile station shall begin monitoring the assigned Forward Traffic Channel within  $T_{61m}$  seconds.

If the *Handoff Direction Message* specifies a CDMA to CDMA hard handoff using the current CDMA frequency assignment, the mobile station shall begin monitoring the assigned Forward Traffic Channel within  $T_{62m}$  seconds.

### 6.6.6.2.9 CDMA to Analog Handoff

The base station directs the mobile station to perform a CDMA to Analog handoff by sending an *Analog Handoff Direction Message*.

The mobile station shall store the following parameters from the *Analog Handoff Direction Message*:

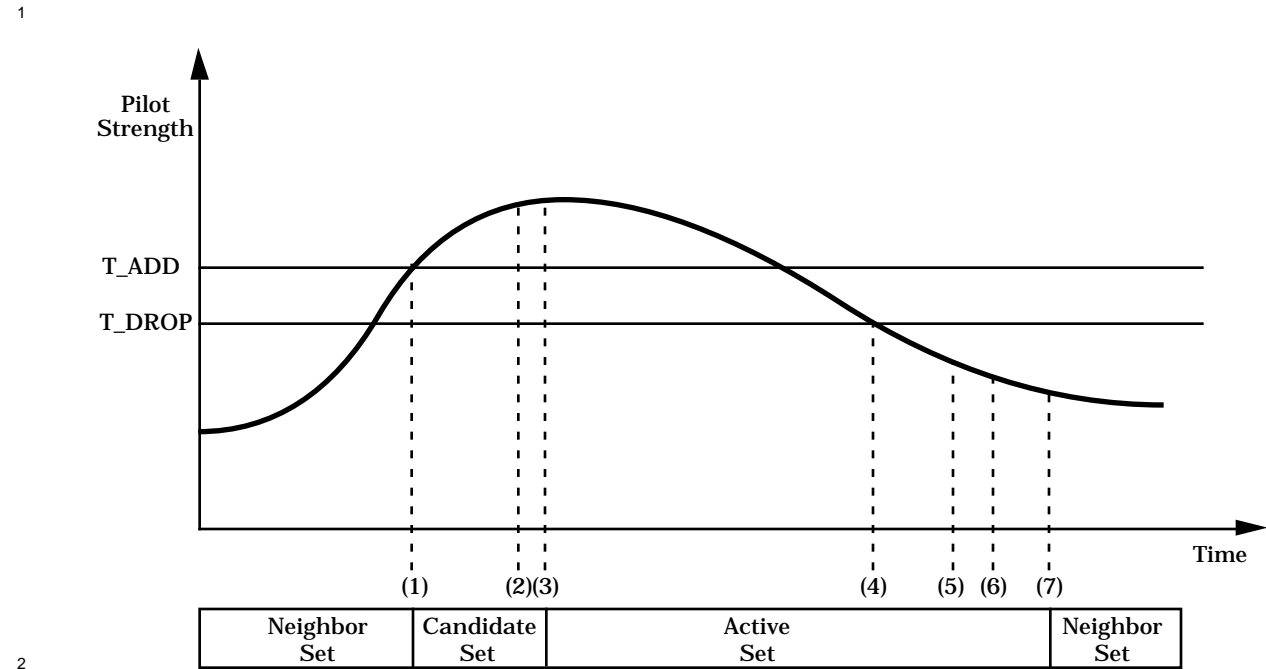
- System identification ( $SID_S = SID_R$ )
- Voice mobile station attenuation code ( $VMAC_S = VMAC_R$ )
- Analog voice channel number ( $ANALOG\_CHAN_S = ANALOG\_CHAN_R$ )
- SAT color code ( $SCC_S = SCC_R$ )
- Message encryption mode indicator ( $MEM_S = MEM_R$ )

At the action time specified by the *Analog Handoff Direction Message* (see 6.6.4.1.5), the mobile station shall disable its transmitter. The mobile station shall enable its transmitter on the analog voice channel within  $T_{63m}$  seconds.

### 6.6.6.3 Examples

The following examples illustrate typical message exchanges between the mobile station and the base station during handoff. Refer to Appendix B for examples of call processing during handoff.

Figure 6.6.6.3-1 shows an example of the messages exchanged between the mobile station and the base station during a typical handoff process.

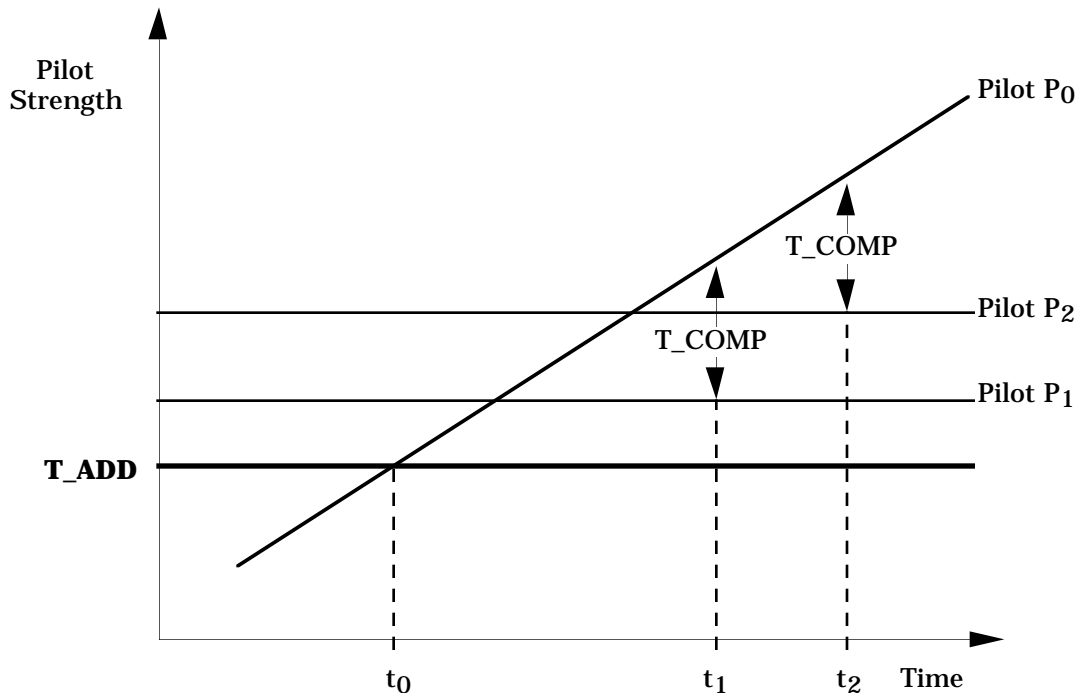


- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- (1) Pilot strength exceeds  $T\_ADD$ . Mobile station sends a *Pilot Strength Measurement Message* and transfers pilot to the Candidate Set.
  - (2) Base station sends a *Handoff Direction Message*.
  - (3) Mobile station transfers pilot to the Active Set and sends a *Handoff Completion Message*.
  - (4) Pilot strength drops below  $T\_DROP$ . Mobile station starts the handoff drop timer.
  - (5) Handoff drop timer expires. Mobile station sends a *Pilot Strength Measurement Message*.
  - (6) Base station sends a *Handoff Direction Message*.
  - (7) Mobile station moves pilot from the Active Set to the Neighbor Set and sends a *Handoff Completion Message*.

15

**Figure 6.6.6.3-1. Handoff Threshold Example**

Figure 6.6.6.3-2 illustrates the messaging triggered by a pilot of the Candidate Set as its strength gradually rises above the strength of each pilot of the Active Set. Note that the mobile station reports that a Candidate Set pilot is stronger than an Active Set pilot only if the difference between their respective strengths is at least  $T\_COMP$ .



Candidate Set: Pilot P<sub>0</sub>

Active Set: Pilots P<sub>1</sub>, P<sub>2</sub>

$t_0$  — Pilot Strength Measurement Message sent,  $P_0 > T\_ADD$

$t_1$  — Pilot Strength Measurement Message sent,  $P_0 > P_1 + T\_COMP$

$t_2$  — Pilot Strength Measurement Message sent,  $P_0 > P_2 + T\_COMP$

**Figure 6.6.6.3-2. Pilot Strength Measurements Triggered by a Candidate Pilot**

## 6.6.7 Hash Functions and Randomization

### 6.6.7.1 Hash Function

Certain procedures require a uniform distribution of mobile stations among  $N$  resources. The following function returns an integer, using as arguments the mobile station's 32-bit ESN, the number of resources  $N$ , and a modifier DECORR. The modifier serves to decorrelate the values obtained for the various applications from the same ESN.

Define:

- Word L to be bits 0-15 of the ESN
- Word H to be bits 16-31 of the ESN

where bit 0 is the least significant bit of the ESN. The hash value is computed as follows:<sup>30</sup>

$$R = \lfloor N \times ((40503 \times (L \oplus H \oplus \text{DECORR})) \bmod 2^{16}) / 2^{16} \rfloor$$

The mobile station shall choose the range N and the 16-bit modifier DECORR according to the application as shown in Table 6.6.7.1-1. In the table, ESN [0...11] denotes the 12 least significant bits of the ESN.

**Table 6.6.7.1-1. Hash Function Modifier**

Application	N	DECORR	Return Value
CDMA Channel Number	Number of channels in last <i>CDMA Channel List Message</i> (up to 10)	0	R + 1
Paging Channel Number	PAGE_CHAN <sub>s</sub> from <i>System Parameters Message</i> (up to 7)	2 × ESN [0...11]	R + 1
Paging Slot Number	640	6 × ESN [0...11]	R
Access Channel PN Randomization	2 <sup>PROBE_PN_RAN<sub>s</sub></sup> where PROBE_PN_RAN is from <i>Access Parameters Message</i> (up to 512)	14 × ESN [0...11]	R

#### 6.6.7.2 Pseudorandom Number Generator

Where pseudorandom numbers are needed in the CDMA cellular protocols, a linear congruential generator shall be used. The mobile station shall implement the linear congruential generator defined by:

$$z_n = a \times z_{n-1} \bmod m$$

where  $a = 7^5 = 16807$  and  $m = 2^{31} - 1 = 2147483647$ .  $z_n$  is the output of the generator.<sup>31</sup>

<sup>30</sup>This formula is adapted from Knuth, D. N., *Sorting and Searching*, vol. 3 of *The Art of Computer Programming*, 3 vols., (Reading, MA: Addison-Wesley, 1973), pp. 508-513.

<sup>31</sup>This generator has full period, ranging over all integers between 1 and m-1; the values 0 and m are never produced. Several suitable implementations can be found in Park, Stephen K. and Miller, Keith W., "Random Number Generators: Good Ones are Hard to Find," *Communications of the ACM*, vol. 31, no. 10, October 1988, pp. 1192-1201.

1 During the *Mobile Station Initialization State*, the mobile station shall seed its generator with

$$z_0 = (\text{ESN} \oplus \text{RANDOM\_TIME}) \bmod m$$

3 where RANDOM\_TIME shall be the least-significant 32-bits of SYS\_TIME<sub>S</sub> stored from the  
4 *Sync Channel Message*. If the initial value so produced is found to be zero, it shall be  
5 replaced with one. The mobile station shall compute a new  $z_n$  for each subsequent use.

6 The mobile station shall use the value  $u_n = z_n / m$  for those applications that require a  
7 binary fraction  $u_n$ ,  $0 < u_n < 1$ .

8 The mobile station shall use the value  $k_n = \lfloor N \times z_n / m \rfloor$  for those applications that require  
9 a small integer  $k_n$ ,  $0 \leq k_n \leq N-1$ .



## 6.7 Signaling Formats

This section describes the messages sent by the mobile station.

Some bits in the following message formats are marked as RESERVED. These bits allow for extensions to the basic message for future features and capabilities. The mobile station sets all reserved bits to '0'.

All messages have a set of acknowledgement fields. These fields are ACK\_SEQ, MSG\_SEQ, ACK\_REQ, and VALID\_ACK for Access Channel messages and ACK\_SEQ, MSG\_SEQ, and ACK\_REQ for Reverse Traffic Channel messages.

In any multi-bit field of a signaling message, the most significant bit shall be transmitted first.

### 6.7.1 Access Channel

This section describes the messages sent by the mobile station on the Access Channel (see 6.1.3.2).

#### 6.7.1.1 Access Channel Structure

An Access Channel slot are  $(3 + \text{MAX\_CAP\_SZ}) + (1 + \text{PAM\_SZ})$  Access Channel frames in length. An Access Channel slot begins and ends on an Access Channel frame boundary. Access Channel slots begin at Access Channel frames in which

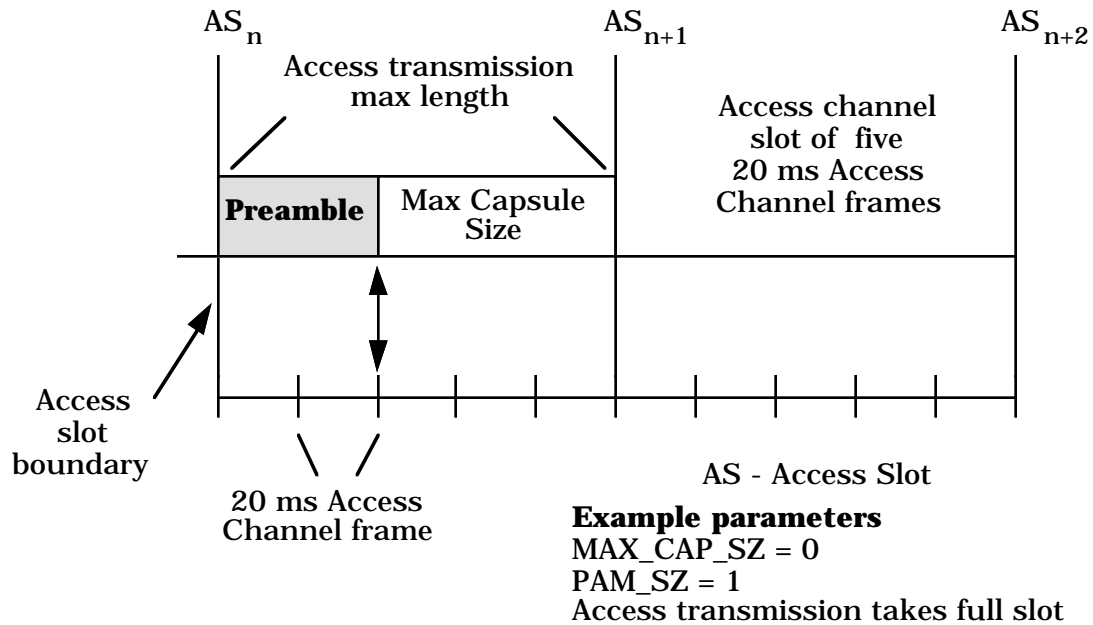
$$t \bmod (4 + \text{MAX\_CAP\_SZ} + \text{PAM\_SZ}) = 0,$$

where  $t$  is the System Time in frames. Note that all Access Channels associated with a particular Paging Channel have the same slot size and that all of the slots begin at the same time. Figure 6.7.1.1-1 shows an example of Access Channel slots. Figure 6.7.1.1-2 shows the Access Channel structure.

The Access Channel slot length may differ from base station to base station. A mobile station shall determine the beginning and length of the Access Channel slot prior to transmission.

An Access Channel transmission consists of the Access Channel preamble and the Access Channel message capsule. An Access Channel transmission shall be an integer number of Access Channel frames in length and shall not exceed  $4 + \text{MAX\_CAP\_SZ} + \text{PAM\_SZ}$  Access Channel frames in length.

On each Access Channel transmission, the mobile station shall transmit a preamble consisting of continuous Walsh symbol zero starting at the beginning of the slot (plus PN randomization as specified in 6.6.3.1.1.2) and  $1 + \text{PAM\_SZ}$  Access Channel frames in length. The mobile station shall transmit an Access Channel message capsule immediately following the preamble.



**Figure 6.7.1.1-1. Example of Access Channel Slot Structure**

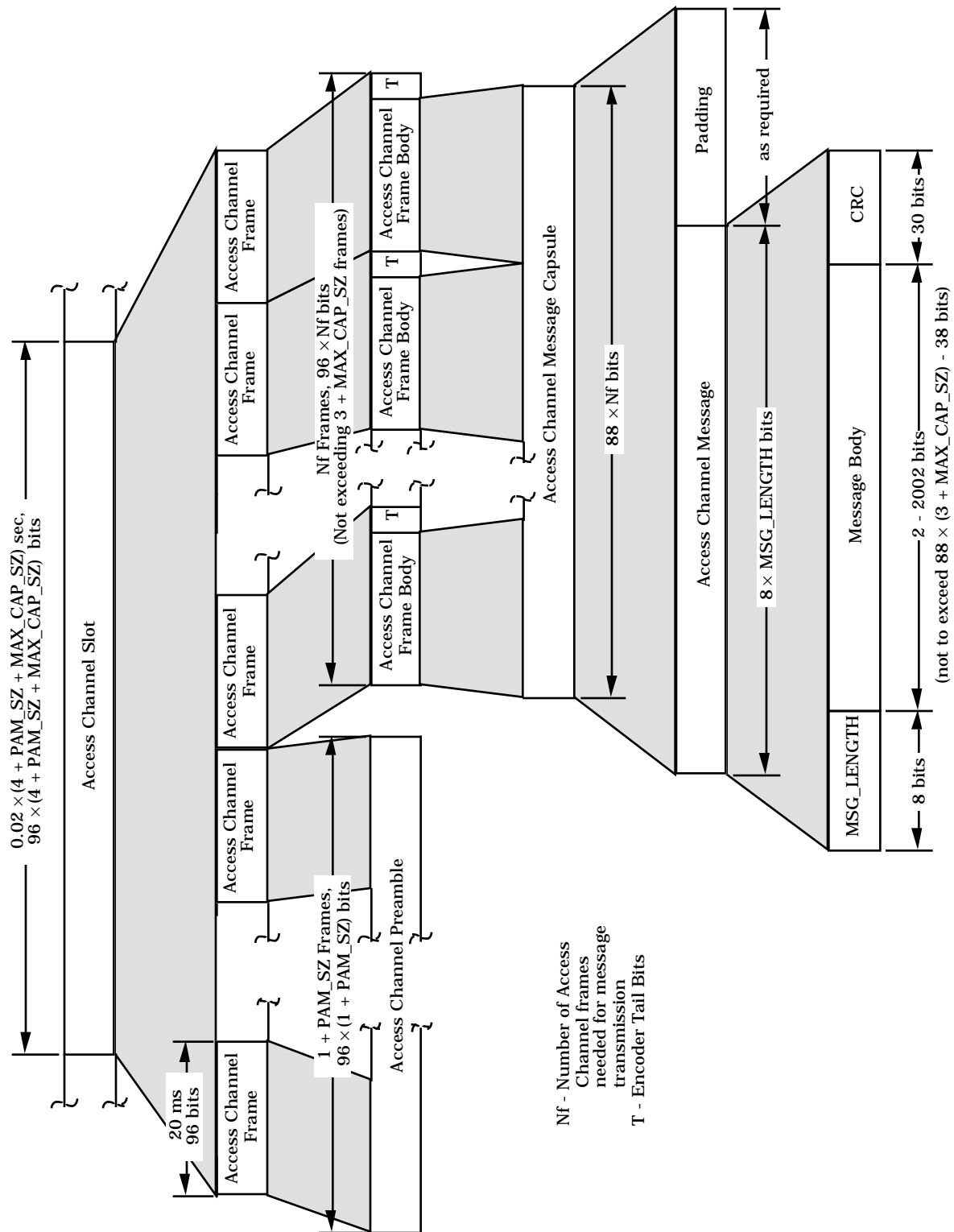


Figure 6.7.1.1-2. Access Channel Structure

### 6.7.1.2 Access Channel Message Structure

An Access Channel message capsule consists of an Access Channel message and padding, as shown in Figure 6.7.1.2-1. The length of the Access Channel message capsule shall be an integer number of Access Channel frames given by

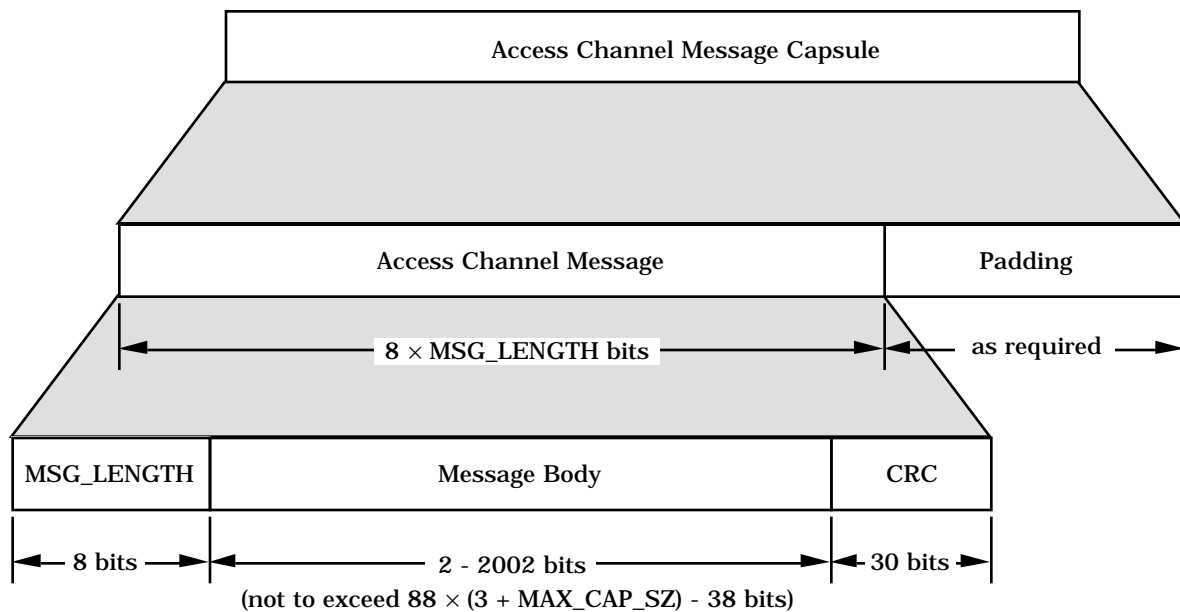
$$CAP\_SZ = \left\lceil \frac{8 + \text{Message Body Length} + 30}{88} \right\rceil$$

where  $\lceil x \rceil$  denotes smallest integer equal to or exceeding  $x$ .

Each Access Channel message shall consist of a length field, a message body, and a CRC, in that order. The message body size shall be selected so that  $CAP\_SZ$  does not exceed  $3 + MAX\_CAP\_SZ$ . The mobile station shall transmit the Access Channel message immediately following the preamble.

The mobile station shall transmit padding consisting of zero or more '0' bits immediately following the Access Channel message. The length of the padding shall be such that

$$8 + \text{Message Body Length} + 30 + \text{Padding Length} = 88 \times CAP\_SZ.$$



**Figure 6.7.1.2-1. Access Channel Message Structure**

#### 6.7.1.2.1 Access Channel MSG\_LENGTH Field

The mobile station shall set the MSG\_LENGTH field of each Access Channel signaling message to the length of the message in octets, including the MSG\_LENGTH field, the message body, and the CRC, but not including the preamble or the padding. The MSG\_LENGTH field shall be 8 bits in length. The maximum Access Channel message length is therefore 255 octets, or 2040 bits.

#### 6.7.1.2.2 Access Channel Message CRC

A 30-bit CRC shall be computed for each Access Channel signaling message. The CRC shall include the MSG\_LENGTH field and the message body. The generator polynomial for the CRC shall be as follows:

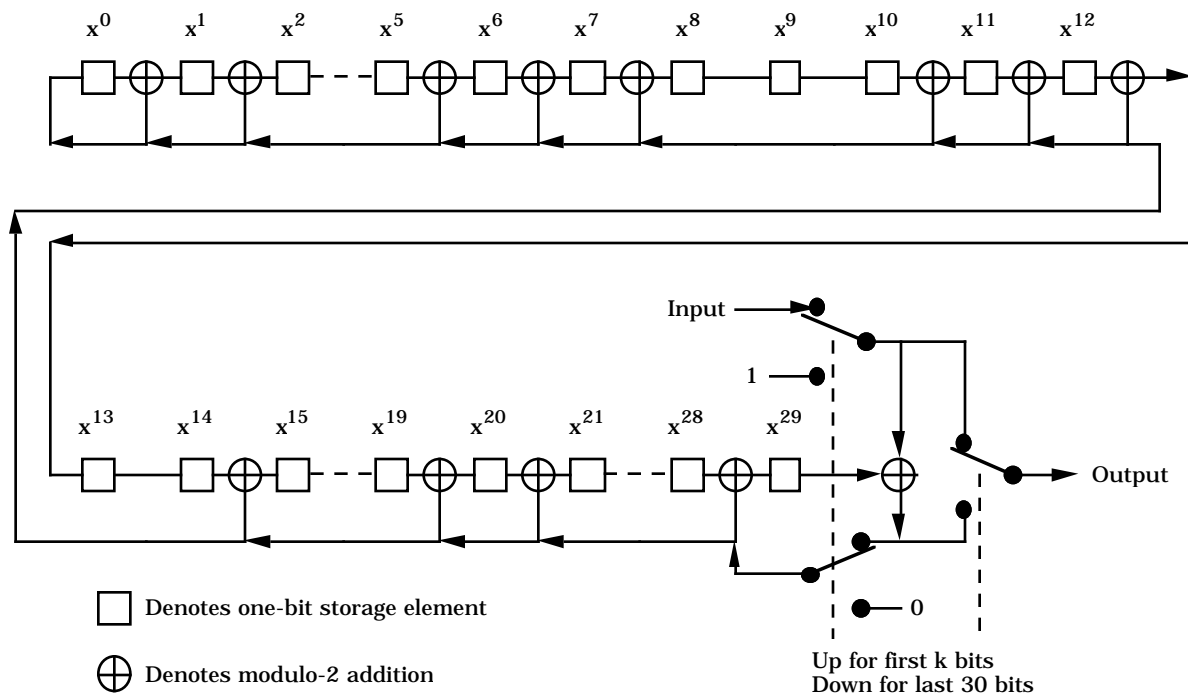
$$g(x) = x^{30} + x^{29} + x^{21} + x^{20} + x^{15} + x^{13} + x^{12} + x^{11} + x^8 + x^7 + x^6 + x^2 + x + 1.$$

The CRC shall be the value computed by the following procedure and the logic shown in Figure 6.7.1.2.2-1:

- All shift register elements shall be initialized to logical one.<sup>32</sup>
- The switches shall be set in the up position.
- The information bit count k shall be defined as 8 + message body length in bits.
- The register shall be clocked k times, with the length and message body of the message as the k input bits.
- The switches shall be set in the down position.
- The register shall be clocked an additional 30 times.
- The 30 additional output bits shall be the check bits.
- The bits shall be transmitted in the order in which they are calculated.

---

<sup>32</sup>Initialization of the register to ones causes the CRC for all-zero data to be non-zero.



**Figure 6.7.1.2.2-1. Access Channel CRC Calculation**

### 6.7.1.3 Access Channel Message Body Format

The messages sent on the Access Channel are summarized in Table 6.7.1.3-1.

**Table 6.7.1.3-1. Access Channel Messages**

<b>Message Name</b>	<b>Message Type (binary)</b>
<i>Initial Registration Message</i>	00000001
<i>Order Message</i>	00000010
<i>Data Burst Message</i>	00000011
<i>Origination Message</i>	00000100
<i>Page Response Message</i>	00000101
<i>Registration Update Message</i>	00000110
<i>Authentication Challenge Response Message</i>	00000111

#### 6.7.1.3.1 Common Fields

##### 6.7.1.3.1.1 Common Fields

All Access Channel messages share the same first five fields:

**ACK\_SEQ** - Acknowledgement sequence number.

The mobile station shall set this field to the value of the MSG\_SEQ field from the most recently received Paging Channel message requiring acknowledgement. If no such message has been received, the mobile station shall set this field to '111'. See 6.6.2.1.2.

**MSG\_SEQ** - Message sequence number.

The mobile station shall set this field to the message sequence number for this message. See 6.6.3.1.2.

**ACK\_REQ** - Acknowledgement required indicator. This field indicates whether this message requires an acknowledgement. The mobile station shall set this field to '1'.

**VALID\_ACK** - Valid acknowledgement indicator.

To acknowledge a Paging Channel message, the mobile station shall set this field to '1'. Otherwise, the mobile station shall set this field to '0'. See 6.6.2.1.2.

**ESN** - Mobile station's electronic serial number.

The mobile station shall set this field to its electronic serial number. See 2.3.2.

### 6.7.1.3.1.2 Common Authentication Fields

Most Access Channel messages share the same four fields related to authentication:

**AUTH\_MODE** - Authentication mode.

If authentication information is not available, or if the base station has indicated that authentication is not required (by setting the AUTH field in the *Access Parameters Message* to '00'), the mobile station shall set this field to '00'. If authentication is required by the base station and authentication information is available, the mobile station shall set this field to '01'. All other values are reserved.

**AUTHR** - Authentication data.

If the AUTH\_MODE field is set to '01', the mobile station shall set this field as specified in 6.3.12.1. If the AUTH\_MODE field is set to any other value, the mobile station shall omit this field.

**RANDC** - Random challenge value.

If the AUTH\_MODE field is set to '01', the mobile station shall set this field as specified in 6.3.12.1. If the AUTH\_MODE field is set to any other value, the mobile station shall omit this field.

**COUNT** - Call history parameter.

If the AUTH\_MODE field is set to '01', the mobile station shall set this field to the current value of the COUNT<sub>s-p</sub> parameter. If the AUTH\_MODE field is set to any other value, the mobile station shall omit this field.

### 6.7.1.3.2 Message Body Contents

The following sections specify the contents of the message body for each message that may be sent on the Access Channel.



### 6.7.1.3.2.1 Initial Registration Message

When the mobile station sends an *Initial Registration Message*, it shall use the following variable-length message format:

Field	Length (bits)
MSG_TYPE ('00000001')	8
ACK_SEQ	2
MSG_SEQ	2
ACK_REQ	1
VALID_ACK	1
ESN	32
AUTH_MODE	2
AUTHR	0 or 18
RANDC	0 or 8
COUNT	0 or 6
REG_TYPE	4
MORE_MINS	1
SLOT_CYCLE_INDEX	3
MOB_CAI_REV	8
SCM	8

One or more occurrences of the following record:

ADD_DEL	1
MIN1	24
MIN2	10
HOME_SID	15
MOB_TERM	1

RESERVED	0 - 7 (as needed)
----------	-------------------

MSG\_TYPE - Message type.

The mobile station shall set this field to '00000001'.

ACK\_SEQ - Acknowledgement sequence number.

See 6.7.1.3.1.

MSG\_SEQ - Message sequence number.

See 6.7.1.3.1.

ACK\_REQ - Acknowledgement required indicator.

See 6.7.1.3.1.

VALID\_ACK - Valid acknowledgement indicator.

See 6.7.1.3.1.

ESN - Mobile station's electronic serial number.

See 6.7.1.3.1.

AUTH\_MODE - Authentication mode.

See 6.7.1.3.2.

AUTHR - Authentication data.

See 6.7.1.3.2.

RANDC - Random challenge value.

See 6.7.1.3.2.

COUNT - Call history parameter.

See 6.7.1.3.2.

REG\_TYPE - Registration type.

This field indicates which type of event generated the registration attempt.

The mobile station shall set this field to the REG\_TYPE value shown in Table 6.7.1.3.2.1-1 corresponding to the event that caused this registration to occur (see 6.6.5.1).

**Table 6.7.1.3.2.1-1. Registration Type (REG\_TYPE) Codes**

<b>REG_TYPE (binary)</b>	<b>Type of Registration</b>
0000	Timer-based (see 6.6.5.1.3)
0001	Power-up (see 6.6.5.1.1)
0010	Zone-based (see 6.6.5.1.5)
0011	Power-down (see 6.6.5.1.2)
0100	Parameter-change (see 6.6.5.1.6)
0101	Ordered (see 6.6.5.1.7)
0110	Distance-based (see 6.6.5.1.4)
All other REG_TYPE values are reserved.	

1	MORE_MINS	-	More MINs to follow indicator.
2			This indicator specifies whether additional MINs are to be sent
3			in later <i>Registration Update Messages</i> .
4			If all MINs actively supported by the mobile station are
5			included in this message, the mobile station shall set this field
6			to '0'. If not, the mobile station shall set this field to '1'.
7	SLOT_CYCLE_INDEX	-	Slot cycle mode.
8			If the mobile station is operating in non-slotted mode, it shall
9			set this field to '000'. If the mobile station is operating in
10			slotted mode, it shall set this field to the SLOT_CYCLE_INDEX
11			value in use (see 6.6.2.1.1).
12	MOB_CAI_REV	-	CAI revision of the mobile station.
13			The mobile station shall set this field to '00000001'.
14	SCM	-	Station class mark.
15			The mobile station shall set this field to its station class mark.
16			See 2.3.3.
17	The mobile station shall include one occurrence of the following five-field record for each		
18	MIN included in this message.		
19	ADD_DEL	-	Add/Delete indicator.
20			This field indicates whether the MIN in this record is to be
21			added to or deleted from the list of active MINs for this mobile
22			station. In this message, all MINs are to be added to the list.
23			The mobile station shall set this field to '1'.
24	MIN1	-	First part of the mobile station identification number (MIN).
25			The mobile station shall set this field to the MIN1 value for the
26			MIN specified by this record.
27	MIN2	-	Second part of the mobile station identification number (MIN).
28			The mobile station shall set this field to the MIN2 value for the
29			MIN specified by this record.
30	HOME_SID	-	Home system identification.
31			The mobile station shall set this field to the SID of the home
32			cellular system for the MIN specified by this record.
33	MOB_TERM	-	Mobile terminated calls accepted indicator.
34			If the MIN specified by this record is configured to accept
35			mobile terminated calls while operating with the current
36			roaming status (see 6.6.5.3), the mobile station shall set this
37			bit to '1'. Otherwise, the mobile station shall set this bit to '0'.

1  
2  
3  
4  
5  
6

**RESERVED** - Reserved bits.

The mobile station shall add reserved bits as needed in order to make the length of the entire message equal to an integer number of octets. The mobile station shall set these bits to '0'.

## 6.7.1.3.2.2 Order Message

When the mobile station sends an *Order Message* on the Access Channel, it shall use the following variable-length message format:

Field	Length (bits)
MSG_TYPE ('00000010')	8
ACK_SEQ	2
MSG_SEQ	2
ACK_REQ	1
VALID_ACK	1
ESN	32
RESERVED	2
ORDER	6
ADD_RECORD_LEN	3
order-specific fields (if used)	$8 \times \text{ADD\_RECORD\_LEN}$
RESERVED	1

MSG\_TYPE - Message type.

The mobile station shall set this field to '00000010'.

ACK\_SEQ - Acknowledgement sequence number.

See 6.7.1.3.1.

MSG\_SEQ - Message sequence number.

See 6.7.1.3.1.

ACK\_REQ - Acknowledgement required indicator.

See 6.7.1.3.1.

VALID\_ACK - Valid acknowledgement indicator.

See 6.7.1.3.1.

ESN - Mobile station's electronic serial number.

See 6.7.1.3.1.

RESERVED - Reserved bits.

These bits take the place of the AUTH\_MODE field.

The mobile station shall set this field to '00'.

ORDER - Order code.

The mobile station shall set this field to the ORDER code (see 6.7.3) for this type of order message.

1	ADD_RECORD_LEN	-	Additional record length.
2			The mobile station shall set this field to the number of octets
3			in the order-specific fields included in this message.
4	order-specific fields	-	Order-specific fields.
5			The mobile station shall include order-specific fields as
6			specified in 6.7.3.
7	RESERVED	-	Reserved bits.
8			The mobile station shall set this field to '0'.

## 6.7.1.3.2.3 Data Burst Message

When the mobile station sends a *Data Burst Message* on the Access Channel, it shall use the following variable-length message format:

Field	Length (bits)
MSG_TYPE ('00000011')	8
ACK_SEQ	2
MSG_SEQ	2
ACK_REQ	1
VALID_ACK	1
ESN	32
AUTH_MODE	2
AUTHR	0 or 18
RANDC	0 or 8
COUNT	0 or 6
MSG_NUMBER	8
MIN1	24
MIN2	10
BURST_TYPE	6
NUM_MSGS	8
NUM_FIELDS	8
NUM_FIELDS occurrences of the following field:	
CHAR <sub>i</sub>	8
RESERVED	2

- MSG\_TYPE - Message type.  
The mobile station shall set this field to '00000011'.
- ACK\_SEQ - Acknowledgement sequence number.  
See 6.7.1.3.1.
- MSG\_SEQ - Message sequence number.  
See 6.7.1.3.1.
- ACK\_REQ - Acknowledgement required indicator.  
See 6.7.1.3.1.

- Table 6.7.1.3.2.3-1. Burst Data Types**

NUM\_MSG - Number of messages in the data burst stream.

The mobile station shall set this field to the number of messages within this data burst stream.



1	NUM_FIELDS	-	Number of characters in this message.
2			The mobile station shall set this field to the number of CHARi
3			fields included in this message.
4	CHARi	-	Character.
5			The mobile station shall include NUM_FIELDS occurrences of
6			this field. The mobile station shall set these fields to the
7			corresponding octet of the data burst stream.
8	RESERVED	-	Reserved bits.
9			The mobile station shall set this field to '00'.

## 6.7.1.3.2.4 Origination Message

When the mobile station sends an *Origination Message*, it shall use the following variable-length message format:

Field	Length (bits)
MSG_TYPE ('00000100')	8
ACK_SEQ	2
MSG_SEQ	2
ACK_REQ	1
VALID_ACK	1
ESN	32
AUTH_MODE	2
AUTHR	0 or 18
RANDC	0 or 8
COUNT	0 or 6
MIN1	24
MIN2	10
SCM	8
REQUEST_MODE	3
SPECIAL_MUX	1
MUX_OPTION	0 or 8
SPECIAL_SERVICE	1
SERVICE_OPTION	0 or 16
DIGIT_MODE	1
NUMBER_TYPE	0 or 3
NUMBER_PLAN	0 or 4
MORE_FIELDS	1
NUM_FIELDS	8

NUM\_FIELDS occurrences of the following field:

CHAR <sub>i</sub>	4 or 8
-------------------	--------

RESERVED	0 - 7 (as needed)
----------	-------------------

1	MSG_TYPE	-	Message type.
2			The mobile station shall set this field to '00000100'.
3	ACK_SEQ	-	Acknowledgement sequence number.
4			See 6.7.1.3.1.
5	MSG_SEQ	-	Message sequence number.
6			See 6.7.1.3.1.
7	ACK_REQ	-	Acknowledgement required indicator.
8			See 6.7.1.3.1.
9	VALID_ACK	-	Valid acknowledgement indicator.
10			See 6.7.1.3.1.
11	ESN	-	Mobile station's electronic serial number.
12			See 6.7.1.3.1.
13	AUTH_MODE	-	Authentication mode.
14			See 6.7.1.3.2.
15	AUTHR	-	Authentication data.
16			See 6.7.1.3.2.
17	RANDC	-	Random challenge value.
18			See 6.7.1.3.2.
19	COUNT	-	Call history parameter.
20			See 6.7.1.3.2.
21	MIN1	-	First part of the mobile station identification number (MIN).
22			The mobile station shall set this field to the MIN1 value of the
23			MIN originating the call.
24	MIN2	-	Second part of the mobile station identification number (MIN).
25			The mobile station shall set this field to the MIN2 value of the
26			MIN originating the call.
27	SCM	-	Station class mark.
28			The mobile station shall set this field to the station class mark
29			of the mobile station. See 2.3.3.
30	REQUEST_MODE	-	Requested mode code. The mobile station shall set this field
31			to the value shown in Table 6.7.1.3.2.4-1 corresponding to its
32			current configuration.
33			

**Table 6.7.1.3.2.4-1. REQUEST\_MODE Codes**

<b>Value (binary)</b>	<b>Requested Mode</b>
001	CDMA only
010	Analog only
011	Either CDMA or analog
All other REQUEST_MODE codes are reserved.	

**SPECIAL\_MUX** - Special multiplex option indicator.

To request a special frame format or multiplex rule for this call, the mobile station shall set this field to '1'. To request the default multiplex option (Multiplex Option 1) for this call, the mobile station shall set this field to '0'.

**MUX\_OPTION** - Multiplex option for this call.

If the SPECIAL\_MUX field is set to '1', the mobile station shall set this field to the value shown in Table 6.7.1.3.2.4-2 corresponding to the requested multiplex option. If the SPECIAL\_MUX field is set to '0', the mobile station shall omit this field.

**Table 6.7.1.3.2.4-2. Multiplex Options**

<b>Value (binary)</b>	<b>Multiplex Option</b>
00000001	Multiplex Option 1
All other Multiplex Option codes are reserved.	

**SPECIAL\_SERVICE** - Special service option indicator.

To request a special service option, the mobile station shall set this field to '1'. To request the default service option (Service Option 1), the mobile station shall set this field to '0'.

**SERVICE\_OPTION** - Requested service option for this call.

If the SPECIAL\_SERVICE field is set to '1', the mobile station shall set this field to the value shown in Table A-1 corresponding to the requested service option. If the SPECIAL\_SERVICE field is set to '0', the mobile station shall omit this field.

**DIGIT\_MODE** - Digit mode indicator.

This field indicates whether the dialed digits are 4-bit DTMF codes using the Unknown numbering plan, or 8-bit ASCII codes using a specified numbering plan.

To originate the call using the binary representation of DTMF digits, the mobile station shall set this field to '0'. To originate the call using ASCII characters, the mobile station shall set this field to '1'.

**NUMBER\_TYPE** - Type of number.

If the DIGIT\_MODE field is set to '1', the mobile station shall set this field to the NUMBER\_TYPE value shown in Table 6.7.1.3.2.4-3 corresponding to the type of the number as defined in ANSI T1.607 §4.5.9. If the DIGIT\_MODE field is set to '0', the mobile station shall omit this field.

**Table 6.7.1.3.2.4-3. Number Types**

<b>Description</b>	<b>NUMBER_TYPE (binary)</b>
Unknown	000
International number	001
National number	010
Network-specific number	011
Subscriber number	100
Reserved	101
Abbreviated number	110
Reserved for extension	111

**NUMBER\_PLAN** - Numbering plan.

If the DIGIT\_MODE field is set to '1', the mobile station shall set this field to the NUMBER\_PLAN value shown in Table 6.7.1.3.2.4-4 corresponding to the requested numbering plan. If the DIGIT\_MODE field is set to '0', the mobile station shall omit this field.

**Table 6.7.1.3.2.4-4. Numbering Plan Identification**  
**(DIGIT\_MODE = '1') (See ANSI T1.607 §4.5.9)**

<b>Description</b>	<b>NUMBER_PLAN (binary)</b>
Unknown	0000
ISDN/Telephony numbering plan (CCITT E.164 and CCITT E.163)	0001
Data numbering plan (CCITT X.121)	0011
Telex numbering plan (CCITT F.69)	0100
Private numbering plan	1001
Reserved for extension	1111
All other NUMBER_PLAN codes are reserved.	

**MORE\_FIELDS** - More dialed digits indicator.

This field indicates whether additional dialed digits will be sent in a later *Origination Continuation Message*.

If all dialed digits will fit in this message, the mobile station shall set this field to '0'. If not, the mobile station shall set this field to '1'.

**NUM\_FIELDS** - Number of dialed digits in this message.

The mobile station shall set this field to the number of dialed digits included in this message.

**CHARi** - A dialed digit or character.

The mobile station shall include NUM\_FIELDS occurrences of this field. If the DIGIT\_MODE field is set to '0', the mobile station shall set each occurrence of this field to the code value shown in Table 6.7.1.3.2.4-5 corresponding to the dialed digit. If the DIGIT\_MODE field is set to '1', the mobile station shall set each occurrence of this field to the ASCII representation corresponding to the dialed digit, as specified in ANSI X3.4, with the most significant bit set to '0'.

**Table 6.7.1.3.2.4-5. Representation of DTMF Digits**

<b>Digit</b>	<b>Code (binary)</b>	<b>Digit</b>	<b>Code (binary)</b>
1	0001	7	0111
2	0010	8	1000
3	0011	9	1001
4	0100	0	1010
5	0101	*	1011
6	0110	#	1100
All other codes are reserved.			

**RESERVED** - Reserved bits.

The mobile station shall add reserved bits as needed in order to make the length of the entire message equal to an integer number of octets. The mobile station shall set these bits to '0'.

#### 6.7.1.3.2.5 Page Response Message

When the mobile station sends a *Page Response Message*, it shall use the following variable-length message format:

Field	Length (bits)
MSG_TYPE ('00000101')	8
ACK_SEQ	2
MSG_SEQ	2
ACK_REQ	1
VALID_ACK	1
ESN	32
AUTH_MODE	2
AUTHR	0 or 18
RANDC	0 or 8
COUNT	0 or 6
MIN1	24
MIN2	10
SCM	8
REQUEST_MODE	3
RESERVED	5

- MSG\_TYPE - Message type.  
The mobile station shall set this field to '00000101'.
- ACK\_SEQ - Acknowledgement sequence number.  
See 6.7.1.3.1.
- MSG\_SEQ - Message sequence number.  
See 6.7.1.3.1.
- ACK\_REQ - Acknowledgement required indicator.  
See 6.7.1.3.1.
- VALID\_ACK - Valid acknowledgement indicator.  
See 6.7.1.3.1.
- ESN - Mobile station's electronic serial number.  
See 6.7.1.3.1.



1	AUTH_MODE	-	Authentication mode.
2			See 6.7.1.3.2.
3	AUTHR	-	Authentication data.
4			See 6.7.1.3.2.
5	RANDC	-	Random challenge value.
6			See 6.7.1.3.2.
7	COUNT	-	Call history parameter.
8			See 6.7.1.3.2.
9	MIN1	-	First part of the mobile station identification number (MIN).
10			The mobile station shall set this field to the MIN1 value from
11			the <i>Page Message</i> or <i>Slotted Page Message</i> to which this
12			message is a response.
13	MIN2	-	Second part of the mobile station identification number (MIN).
14			The mobile station shall set this field to the MIN2 value from
15			the <i>Page Message</i> or <i>Slotted Page Message</i> to which this
16			message is a response.
17	SCM	-	Station class mark.
18			The mobile station shall set this field to the station class mark
19			of the mobile station. See 2.3.3.
20	REQUEST_MODE	-	Requested mode code. The mobile station shall set this field
21			to the value shown in Table 6.7.1.3.2.4-1 corresponding to its
22			current configuration.
23	RESERVED	-	Reserved bits.
24			The mobile station shall set this field to '00000'.

## 6.7.1.3.2.6 Registration Update Message

When the mobile station sends a *Registration Update Message* on the Access Channel, it shall use the following variable-length message format:

Field	Length (bits)
MSG_TYPE ('00000110')	8
ACK_SEQ	2
MSG_SEQ	2
ACK_REQ	1
VALID_ACK	1
ESN	32
AUTH_MODE	2
AUTHR	0 or 18
RANDC	0 or 8
COUNT	0 or 6
REG_TYPE	4
MORE_MINS	1
SCM	8
SLOT_CYCLE_INDEX	3

Zero or more occurrences of the following record:

ADD_DEL	1
MIN1	24
MIN2	10
HOME_SID	15
MOB_TERM	1

RESERVED	0-7 (as needed)
----------	-----------------

MSG\_TYPE - Message type.

The mobile station shall set this field to '00000110'.

ACK\_SEQ - Acknowledgement sequence number.

See 6.7.1.3.1.

MSG\_SEQ - Message sequence number.

See 6.7.1.3.1.

1	ACK_REQ	-	Acknowledgement required indicator.
2			See 6.7.1.3.1.
3	VALID_ACK	-	Valid acknowledgement indicator.
4			See 6.7.1.3.1.
5	ESN	-	Mobile station's electronic serial number.
6			See 6.7.1.3.1.
7	AUTH_MODE	-	Authentication mode.
8			See 6.7.1.3.2.
9	AUTHR	-	Authentication data.
10			See 6.7.1.3.2.
11	RANDC	-	Random challenge value.
12			See 6.7.1.3.2.
13	COUNT	-	Call history parameter.
14			See 6.7.1.3.2.
15	REG_TYPE	-	Registration type.
16			This field indicates which type of event generated the
17			registration attempt.
18			The mobile station shall set this field to the REG_TYPE value
19			shown in Table 6.7.1.3.2.1-1 corresponding to the event
20			which caused this registration to occur.
21	MORE_MINS	-	More MINs to follow indicator.
22			This indicator specifies whether additional MINs are to be sent
23			in later <i>Registration Update Messages</i> .
24			If all MINs to be added or deleted will fit in this message, the
25			mobile station shall set this field to '0'. If not, the mobile
26			station shall set this field to '1'.
27	SCM	-	Station class mark.
28			The mobile station shall set this field to its station class mark.
29			See 2.3.3.
30	SLOT_CYCLE_INDEX	-	Slot cycle mode.
31			If the mobile station is operating in non-slotted mode, it shall
32			set this field to '000'. If the mobile station is operating in
33			slotted mode, it shall set this field to the SLOT_CYCLE_INDEX
34			value in use. See 6.6.2.1.1.
35			

The mobile station shall include one occurrence of the following five-field record for each MIN included in this message.

**ADD\_DEL** - Add/Delete indicator.

This field indicates whether the MIN in this record is to be added to or deleted from the list of active MINs for this mobile station.

To request that the MIN in this record be added to the list, the mobile station shall set this field to '1'. To request that the MIN in this record be deleted from the list, the mobile station shall set this field to '0'.

**MIN1** - First part of the mobile station identification number (MIN).

The mobile station shall set this field to the MIN1 value for the MIN specified by this record.

**MIN2** - Second part of the mobile station identification number (MIN).

The mobile station shall set this field to the MIN2 value for the MIN specified by this record.

**HOME\_SID** - Home system identification.

The mobile station shall set this field to the SID of the home cellular system for the MIN specified by this record.

**MOB\_TERM** - Mobile terminated calls accepted indicator.

If the MIN specified by this record is configured to accept mobile terminated calls while operating with the current roaming status (see 6.6.5.3), the mobile station shall set this bit to '1'. Otherwise, the mobile station shall set this bit to '0'.

**RESERVED** - Reserved bits.

The mobile station shall add reserved bits as needed in order to make the length of the entire message equal to an integer number of octets. The mobile station shall set these bits to '0'.

### 6.7.1.3.2.7 Authentication Challenge Response Message

When the mobile station sends an *Authentication Challenge Response Message* on the Access Channel, it shall use the following fixed-length message format:

Field	Length (bits)
MSG_TYPE ('00000111')	8
ACK_SEQ	2
MSG_SEQ	2
ACK_REQ	1
VALID_ACK	1
ESN	32
RESERVED	2
AUTH_MIN1	24
AUTH_MIN2	10
AUTHU	0 or 18
RESERVED	6

- MSG\_TYPE - Message type.  
The mobile station shall set this field to '00000111'.
- ACK\_SEQ - Acknowledgement sequence number.  
See 6.7.1.3.1.
- MSG\_SEQ - Message sequence number.  
See 6.7.1.3.1.
- ACK\_REQ - Acknowledgement required indicator.  
See 6.7.1.3.1.
- VALID\_ACK - Valid acknowledgement indicator.  
See 6.7.1.3.1.
- ESN - Mobile station's electronic serial number.  
See 6.7.1.3.1.
- RESERVED - Reserved bits.  
These bits take the place of the AUTH\_MODE field.  
The mobile station shall set this field to '00'.

1	AUTH_MIN1	-	First part of the mobile station identification number (MIN).
2			The mobile station shall set this field to the value of the MIN1
3			field from the <i>Authentication Challenge Message</i> to which this
4			message is a response.
5	AUTH_MIN2	-	Second part of the mobile station identification number (MIN).
6			The mobile station shall set this field to the value of the MIN2
7			field from the <i>Authentication Challenge Message</i> to which this
8			message is a response.
9	AUTHU	-	Authentication challenge response.
10			The mobile station shall set this field as specified in
11			6.3.12.1.5.
12	RESERVED	-	Reserved bits.
13			The mobile station shall set this field to '000000'.

6.7.2 Reverse Traffic Channel

The Reverse Traffic Channel is used to send signaling information to the base station during Traffic Channel operation.

6.7.2.1 Reverse Traffic Channel Structure

When sending a message on the Reverse Traffic Channel, the mobile station may use any combination of blank-and-burst and dim-and-burst information bit structures (see 6.1.3.3.11) that allocates enough signaling traffic bits to contain the message. If the number of allocated bits exceeds the number of bits in the message, the mobile station shall transmit the message beginning with the first allocated bit. In the remaining allocated bits, the mobile station shall transmit padding bits. The mobile station shall set the padding bits to '0'.

6.7.2.2 Reverse Traffic Channel Message Structure

A Reverse Traffic Channel message capsule consists of a Reverse Traffic Channel message and padding, as shown in Figure 6.7.2.2-1.

Each Traffic Channel message shall consist of a length field (MSG\_LENGTH), a message body, and a CRC, in that order.

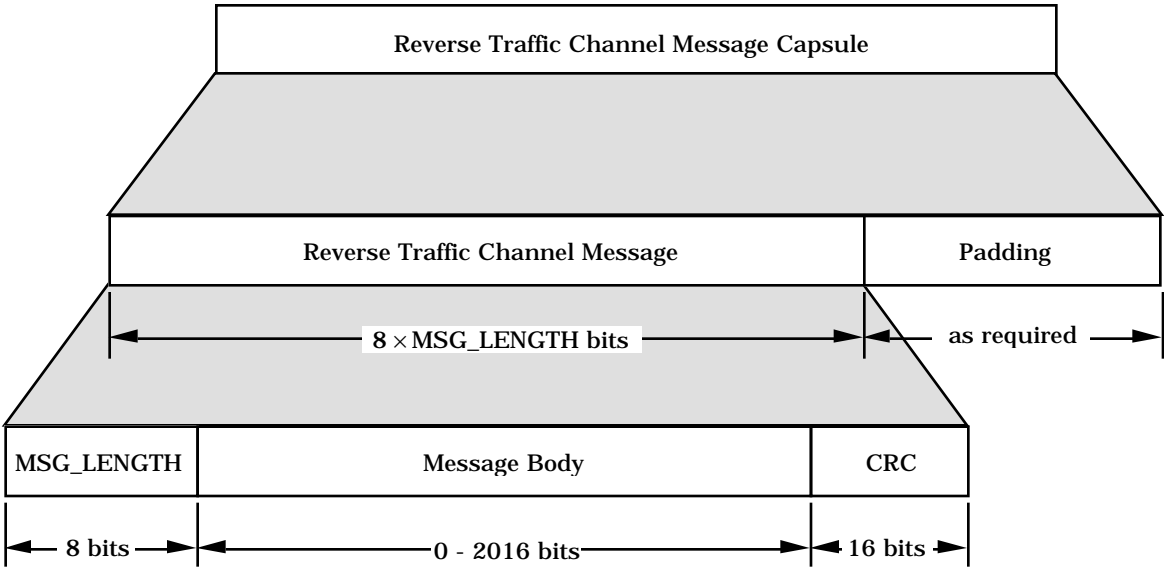


Figure 6.7.2.2-1. Reverse Traffic Channel Message Structure

#### 6.7.2.2.1 Reverse Traffic Channel MSG\_LENGTH Field

The mobile station shall set the MSG\_LENGTH field of each Reverse Traffic Channel signaling message to the length of the message in octets, including the MSG\_LENGTH field, the message body, and the CRC. The MSG\_LENGTH field shall be 8 bits in length.

#### 6.7.2.2.2 Reverse Traffic Channel Signaling Message CRC

A 16-bit CRC shall be computed for each Reverse Traffic Channel signaling message. The CRC shall include the MSG\_LENGTH field and the message body. The generator polynomial for the CRC shall be the standard CRC-CCITT polynomial:

$$g(x) = x^{16} + x^{12} + x^5 + 1.$$

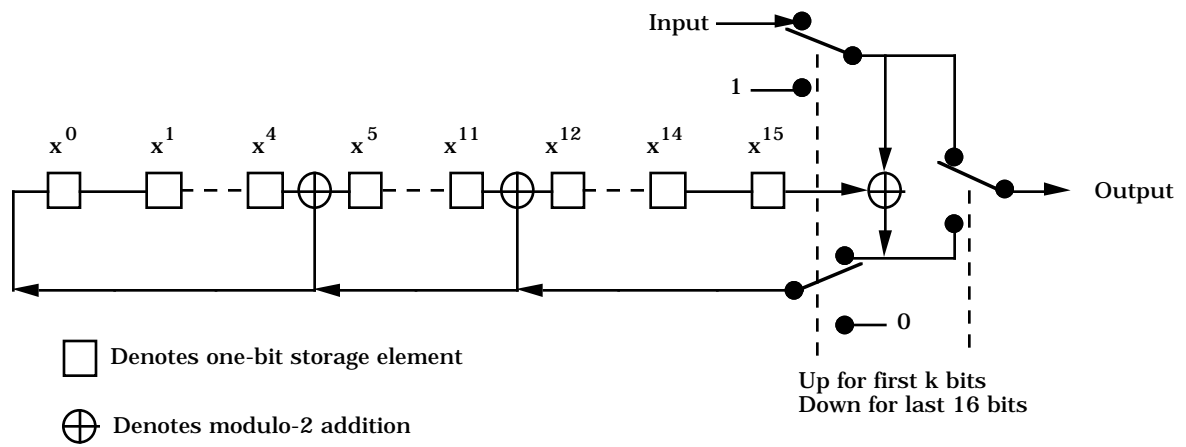
The CRC shall be the value computed by the following procedure and the logic shown in Figure 6.7.2.2.2-1:

- All shift register elements shall be initialized to logical one.<sup>33</sup>
- The switches shall be set in the up position.
- The information bit count k shall be defined as 8 + message body length in bits.
- The register shall be clocked k times, with the length and message body of the message as the k input bits.
- The switches shall be set in the down position.
- The register shall be clocked an additional 16 times.
- The 16 additional output bits shall be the check bits.
- The bits shall be transmitted in the order in which they are calculated.

---

<sup>33</sup>Initialization of the register to ones causes the CRC for all-zero data to be non-zero.





3

4

**Figure 6.7.2.2.2-1. Reverse Traffic Channel Signaling CRC Calculation**

### 6.7.2.3 Reverse Traffic Channel Message Body Format

The Reverse Traffic Channel messages are summarized in Table 6.7.2.3-1.

**Table 6.7.2.3-1. Reverse Traffic Channel Messages**

<b>Message Name</b>	<b>Message Type (binary)</b>
<i>Order Message</i>	00000001
<i>Authentication Challenge Response Message</i>	00000010
<i>Flash With Information Message</i>	00000011
<i>Data Burst Message</i>	00000100
<i>Pilot Strength Measurement Message</i>	00000101
<i>Power Measurement Report Message</i>	00000110
<i>Send Burst DTMF Message</i>	00000111
<i>Status Message</i>	00001000
<i>Origination Continuation Message</i>	00001001
<i>Handoff Completion Message</i>	00001010
<i>Parameters Response Message</i>	00001011

#### 6.7.2.3.1 Common Fields

##### 6.7.2.3.1.1 Common Acknowledgement Fields

All Reverse Traffic Channel messages share the same three acknowledgement fields:

**ACK\_SEQ** - Acknowledgement sequence number.

The mobile station shall set this field to the value of the MSG\_SEQ field from the most recently received Forward Traffic Channel message requiring acknowledgement. If no such message has been received, the mobile station shall set this field to '111'. See 6.6.4.1.3.

**MSG\_SEQ** - Message sequence number.

The mobile station shall set this field to the message sequence number for this message. See 6.6.4.1.3.

1                   ACK\_REQ    -   Acknowledgement required indicator.  
2                                This field indicates whether this message requires an  
3                                acknowledgement.  
4                                To indicate that this message requires acknowledgement, the  
5                                mobile station shall set this field to '1'. To indicate that this  
6                                message does not require acknowledgement, the mobile  
7                                station shall set this field to '0'.

8    6.7.2.3.1.2 Common Encryption Field

9    Many Reverse Traffic Channel messages contain the following field:

10                   ENCRYPTED   -   Message encryption indicator.  
11                                If this message is encrypted, the mobile station shall set this  
12                                field to '1'. If this message is not encrypted, the mobile station  
13                                shall set this field to '0'. See 6.3.12.2.

14   6.7.2.3.2 Message Body Contents

15   The following sections specify the contents of the message body for each message that may  
16   be sent on the Reverse Traffic Channel.

#### 6.7.2.3.2.1 Order Message

When the mobile station sends an *Order Message* on the Reverse Traffic Channel, it shall use the following variable-length message format:

Field	Length (bits)
MSG_TYPE ('00000001')	8
ACK_SEQ	3
MSG_SEQ	3
ACK_REQ	1
ENCRYPTED	1
ORDER	6
ADD_RECORD_LEN	3
Order-specific fields (if used)	$8 \times \text{ADD\_RECORD\_LEN}$
RESERVED	7

MSG\_TYPE - Message type.

The mobile station shall set this field to '00000001'.

ACK\_SEQ - Acknowledgement sequence number.

See 6.7.2.3.1.1.

MSG\_SEQ - Message sequence number.

See 6.7.2.3.1.1.

ACK\_REQ - Acknowledgement required indicator.

See 6.7.2.3.1.1.

ENCRYPTED - Message encryption indicator.

See 6.7.2.3.1.2. The mobile station shall set this field to '0' unless encryption is required for this type of order.

ORDER - Order code.

The mobile station shall set this field to the ORDER code. See 6.7.3.

ADD\_RECORD\_LEN - Additional record length.

The mobile station shall set this field to the number of octets in the order-specific fields included in this message.

Order-specific fields - Order-specific fields.

The mobile station shall include order-specific fields as specified in 6.7.3.

- 1                **RESERVED**        -    Reserved bits.
- 2                                The mobile station shall set this field to '0000000'.

#### 6.7.2.3.2.2 Authentication Challenge Response Message

When the mobile station sends an *Authentication Challenge Response Message* on the Reverse Traffic Channel, it shall use the following fixed-length message format:

Field	Length (bits)
MSG_TYPE ('00000010')	8
ACK_SEQ	3
MSG_SEQ	3
ACK_REQ	1
RESERVED	1
AUTHU	18
RESERVED	6

- MSG\_TYPE - Message type.  
The mobile station shall set this field to '00000010'.
- ACK\_SEQ - Acknowledgement sequence number.  
See 6.7.2.3.1.1.
- MSG\_SEQ - Message sequence number.  
See 6.7.2.3.1.1.
- ACK\_REQ - Acknowledgement required indicator.  
See 6.7.2.3.1.1.
- RESERVED - Reserved bit.  
This field takes the place of the ENCRYPTED bit.  
The mobile station shall set this field to '0'.
- AUTHU - Authentication challenge response.  
The mobile station shall set this field as specified in 6.3.12.1.5.
- RESERVED - Reserved bits.  
The mobile station shall set this field to '000000'.

### 6.7.2.3.2.3 Flash With Information Message

When the mobile station sends a *Flash With Information Message*, it shall use the following variable-length message format:

Field	Length (bits)
MSG_TYPE ('00000011')	8
ACK_SEQ	3
MSG_SEQ	3
ACK_REQ	1
ENCRYPTED	1

One or more occurrences of the following record:

RECORD_TYPE	8
RECORD_LEN	6
Type-specific fields	$8 \times \text{RECORD\_LEN}$

RESERVED	0 - 7 (as needed)
----------	-------------------

MSG\_TYPE - Message type.

The mobile station shall set this field to '00000011'.

ACK\_SEQ - Acknowledgement sequence number.

See 6.7.2.3.1.1.

MSG\_SEQ - Message sequence number.

See 6.7.2.3.1.1.

ACK\_REQ - Acknowledgement required indicator.

See 6.7.2.3.1.1.

ENCRYPTED - Message encryption indicator.

See 6.7.2.3.1.2.

The mobile station shall include one occurrence of the following record for each information record to be included:

RECORD\_TYPE - Information record type.

The mobile station shall set this field to the record type code shown in Table 6.7.4-1 corresponding to the type of this information record.

1	<b>RECORD_LEN</b>	-	Information record length.
2			The mobile station shall set this field to the number of octets
3			in the type-specific fields of this record.
4	<b>Type-specific fields</b>	-	Type-specific fields.
5			The mobile station shall set these fields as specified in 6.7.4
6			for this type of information record.
7			
8	<b>RESERVED</b>	-	Reserved bits.
9			The mobile station shall add reserved bits as needed in order
10			to make the length of the entire message equal to an integer
11			number of octets. The mobile station shall set these bits
12			to '0'.



#### 6.7.2.3.2.4 Data Burst Message

When the mobile station sends a *Data Burst Message* on the Reverse Traffic Channel, it shall use the following variable-length message format:

Field	Length (bits)
MSG_TYPE ('00000100')	8
ACK_SEQ	3
MSG_SEQ	3
ACK_REQ	1
ENCRYPTED	1
MSG_NUMBER	8
MIN1	24
MIN2	10
BURST_TYPE	6
NUM_MSGS	8
NUM_FIELDS	8

NUM\_FIELDS occurrences of the following field:

CHAR <sub>i</sub>	8
-------------------	---

RESERVED	0
----------	---

MSG\_TYPE - Message type.

The mobile station shall set this field to '00000100'.

ACK\_SEQ - Acknowledgement sequence number.

See 6.7.2.3.1.1.

MSG\_SEQ - Message sequence number.

See 6.7.2.3.1.1.

ACK\_REQ - Acknowledgement required indicator.

See 6.7.2.3.1.1.

ENCRYPTED - Message encryption indicator.

See 6.7.2.3.1.2.

MSG\_NUMBER - Message number within the data burst stream.

The mobile station shall set this field to the number of this message within the data burst stream.

1	MIN1	-	First part of the mobile station identification number (MIN).
2			The mobile station shall set this field to the MIN1 value for the
3			MIN sending this message.
4	MIN2	-	Second part of the mobile station identification number (MIN).
5			The mobile station shall set this field to the MIN2 value for the
6			MIN sending this message.
7	BURST_TYPE	-	Data burst type.
8			The mobile station shall set this field to the value shown in
9			Table 6.7.1.3.2.3-1 for the type of this data burst.
10	NUM_MSGS	-	Number of messages in the data burst stream.
11			The mobile station shall set this field to the number of
12			messages within this data burst stream.
13	NUM_FIELDS	-	Number of characters in this message.
14			The mobile station shall set this field to the number of CHARi
15			fields included in this message.
16	CHARi	-	Character.
17			The mobile station shall include NUM_FIELDS occurrences of
18			this field. The mobile station shall set these fields to the
19			corresponding octet of the data burst stream.
20	RESERVED	-	Reserved bits.
21			The mobile station shall omit this field.

#### 6.7.2.3.2.5 Pilot Strength Measurement Message

When the mobile station sends a *Pilot Strength Measurement Message*, it shall use the following variable-length message format:

Field	Length (bits)
MSG_TYPE ('00000101')	8
ACK_SEQ	3
MSG_SEQ	3
ACK_REQ	1
RESERVED	1
REF_PN	9
PILOT_STRENGTH	6

Zero or more occurrences of the following record:

PILOT_PN_PHASE	15
PILOT_STRENGTH	6
KEEP	1

RESERVED	0 - 7 as needed
----------	-----------------

MSG\_TYPE - Message type.

The mobile station shall set this field to '00000101'.

ACK\_SEQ - Acknowledgement sequence number.

See 6.7.2.3.1.1.

MSG\_SEQ - Message sequence number.

See 6.7.2.3.1.1.

ACK\_REQ - Acknowledgement required indicator.

See 6.7.2.3.1.1.

RESERVED - Reserved bit.

This field takes the place of the ENCRYPTED field.

The mobile station shall set this field to '0'.

REF\_PN - Time reference PN sequence offset.

The mobile station shall set this field to the PN sequence offset of the pilot used by the mobile station to derive its time reference, relative to the zero offset pilot PN sequence in units of 64 PN chips.

**PILOT\_STRENGTH** - Pilot strength.

The mobile station shall set this field to

$$\lfloor -2 \times 10 \times \log_{10} PS \rfloor,$$

where PS is the strength of the pilot used by the mobile station to derive its time reference (see 6.1.5.1), measured as specified in 6.6.6.2.2. If this value is less than 0, the mobile station shall set this field to 0. If this value is greater than 63, the mobile station shall set this field to 63.

The mobile station shall include one occurrence of the following three-field record for each pilot in the Active Set and for each pilot in the Candidate Set, other than the pilot identified by the REF\_PN field.

**PILOT\_PN\_PHASE** - Pilot measured phase.

The mobile station shall set this field to the phase of the pilot PN sequence relative to the zero offset pilot PN sequence of this pilot, in units of one PN chip, as specified in 6.6.6.2.4.

**PILOT\_STRENGTH** - Pilot strength.

The mobile station shall set this field to

$$\lfloor -2 \times 10 \times \log_{10} PS \rfloor,$$

where PS is the strength of this pilot, measured as specified in 6.6.6.2.2. If this value is less than 0, the mobile station shall set this field to 0. If this value is greater than 63, the mobile station shall set this field to 63.

**KEEP** - Keep pilot indicator.

For pilots in the Active Set, this field indicates whether the mobile station recommends that this pilot be kept in the Active Set or not. For pilots in the Candidate Set, this field always indicates that the mobile station recommends adding this pilot to the Active Set.

If the strength of this pilot has exceeded T\_DROP within the last interval specified by T\_TDROF, as specified in 6.6.6.2.3, the mobile station shall set this field to '1'. Otherwise, the mobile station shall set this field to '0'.

**RESERVED** - Reserved bits.

The mobile station shall add reserved bits as needed in order to make the length of the entire message equal to an integer number of octets. The mobile station shall set these bits to '0'.

### 6.7.2.3.2.6 Power Measurement Report Message

When the mobile station sends a *Power Measurement Report Message*, it shall use the following variable-length message format:

Field	Length (bits)
MSG_TYPE ('00000110')	8
ACK_SEQ	3
MSG_SEQ	3
ACK_REQ	1
RESERVED	1
ERRORS_DETECTED	5
PWR_MEAS_FRAMES	10
LAST_HDM_SEQ	2
NUM_PILOTS	4

NUM\_PILOTS occurrences of the following field:

PILOT_STRENGTH	6
----------------	---

RESERVED	0 - 7 (as needed)
----------	-------------------

MSG\_TYPE - Message type.

The mobile station shall set this field to '00000110'.

ACK\_SEQ - Acknowledgement sequence number.

See 6.7.2.3.1.1.

MSG\_SEQ - Message sequence number.

See 6.7.2.3.1.1.

ACK\_REQ - Acknowledgement required indicator.

See 6.7.2.3.1.1.

RESERVED - Reserved bit.

This field takes the place of the ENCRYPTED field.

The mobile station shall set this field to '0'.

ERRORS\_DETECTED - Number of frame errors detected.

If the number of bad frames (see 6.2.2.2) received in the measurement period is less than or equal to 31, the mobile station shall set this field to that number. If that number exceeds 31, the mobile station shall set this field to '11111'.

**PWR\_MEAS\_FRAMES** - Number of ForwardTraffic Channelframesin the measurement period.

The mobile station shall set this field to the number of Forward Traffic Channel frames in the measurement period (see 6.6.4.1.1).

**LAST\_HDM\_SEQ** - *Handoff Direction Message* sequence number.

If a *Handoff Direction Message* has been received during this call, the mobile station shall set this field to the value of the HDM\_SEQ field from the *Handoff Direction Message* that determined the current Active Set. If no *Handoff Direction Message* has been received during this call, the mobile station shall set this field to '11'.

**NUM\_PILOTS** - Number of pilots reported.

The mobile station shall set this field to the number of pilots in the current Active Set.

**PILOT\_STRENGTH** - Pilot strength.

The mobile station shall include one occurrence of this field for each pilot in the Active Set. If the Active Set contains more than one pilot, the mobile station shall include the pilot strengths in the same order as in the *Handoff Direction Message* that determined the current Active Set.

The mobile station shall set each occurrence of this field to

$$\lfloor -2 \times 10 \times \log_{10} PS \rfloor,$$

where PS is the strength of the pilot, measured as specified in 6.6.6.2.2. If this value is less than 0, the mobile station shall set this field to 0. If this value is greater than 63, the mobile station shall set this field to 63.

**RESERVED** - Reserved bits.

The mobile station shall add reserved bits as needed in order to make the length of the entire message equal to an integer number of octets. The mobile station shall set these bits to '0'.

### 6.7.2.3.2.7 Send Burst DTMF Message

When the mobile station sends a *Send Burst DTMF Message*, it shall use the following variable-length message format:

Field	Length (bits)
MSG_TYPE ('00000111')	8
ACK_SEQ	3
MSG_SEQ	3
ACK_REQ	1
ENCRYPTED	1
NUM_DIGITS	8
DTMF_ON_LENGTH	3
DTMF_OFF_LENGTH	3

NUM\_DIGITS occurrences of the following field:

DIGIT <sub>i</sub>	4
--------------------	---

RESERVED	0 - 7 (as needed)
----------	-------------------

MSG\_TYPE - Message type.

The mobile station shall set this field to '00000111'.

ACK\_SEQ - Acknowledgement sequence number.

See 6.7.2.3.1.1.

MSG\_SEQ - Message sequence number.

See 6.7.2.3.1.1.

ACK\_REQ - Acknowledgement required indicator.

See 6.7.2.3.1.1.

ENCRYPTED - Message encryption indicator.

See 6.7.2.3.1.2.

NUM\_DIGITS - Number of DTMF digits.

The mobile station shall set this field to the number of DTMF digits included in this message.

DTMF\_ON\_LENGTH - DTMF pulse width code.

The mobile station shall set this field to the DTMF\_ON\_LENGTH value shown in Table 6.7.2.3.2.7-1 corresponding to the requested width of DTMF pulses to be generated by the base station.

**Table 6.7.2.3.2.7-1. Recommended DTMF Pulse Width**

<b>DTMF_ON_LENGTH Field (binary)</b>	<b>Recommended Pulse Width</b>
000	95 ms
001	150 ms
010	200 ms
011	250 ms
100	300 ms
101	350 ms
All other DTMF_ON_LENGTH codes are reserved.	

DTMF\_OFF\_LENGTH - DTMF interdigit interval code.

The mobile station shall set this field to the DTMF\_OFF\_LENGTH value shown in Table 6.7.2.3.2.7-2 corresponding to the requested minimum interval between DTMF pulses to be generated by the base station.

**Table 6.7.2.3.2.7-2. Recommended Minimum Interdigit Interval**

<b>DTMF_OFF_LENGTH Field (binary)</b>	<b>Recommended Minimum Interdigit Interval</b>
000	60 ms
001	100 ms
010	150 ms
011	200 ms
All other DTMF_OFF_LENGTH codes are reserved.	

DIGIT<sub>i</sub> - DTMF digit.

The mobile station shall include one occurrence of this field for each DTMF digit to be generated by the base station. The mobile station shall set each occurrence of this field to the code value shown in Table 6.7.1.3.2.4-5 corresponding to the dialed digit.



1	RESERVED	-	Reserved bits.
2			The mobile station shall add reserved bits as needed in order
3			to make the length of the entire message equal to an integer
4			number of octets. The mobile station shall set these bits
5			to '0'.

#### 6.7.2.3.2.8 Status Message

When the mobile station sends a *Status Message*, it shall use the following variable-length message format:

Field	Length (bits)
MSG_TYPE ('00001000')	8
ACK_SEQ	3
MSG_SEQ	3
ACK_REQ	1
RESERVED	1

One or more occurrences of the following record:

RECORD_TYPE	8
RECORD_LEN	6
Type-specific fields	$8 \times \text{RECORD\_LEN}$

RESERVED	0 - 7 (as needed)
----------	-------------------

- MSG\_TYPE - Message type.  
The mobile station shall set this field to '00001000'.
- ACK\_SEQ - Acknowledgement sequence number.  
See 6.7.2.3.1.1.
- MSG\_SEQ - Message sequence number.  
See 6.7.2.3.1.1.
- ACK\_REQ - Acknowledgement required indicator.  
See 6.7.2.3.1.1.
- RESERVED - Reserved bit.  
This field takes the place of the ENCRYPTED field.  
The mobile station shall set this field to '0'.

The mobile station shall include one occurrence of the following record for each information record to be included:

- RECORD\_TYPE - Information record type.  
The mobile station shall set this field to the record type value shown in Table 6.7.4-1 corresponding to the type of this information record.

1	RECORD_LEN	-	Information record length.
2			The mobile station shall set this field to the number of octets
3			included in the type-specific fields of this information record.
4	Type-specific fields	-	Type-specific fields.
5			The mobile station shall set these fields as specified in 6.7.4
6			for this type of record.
7			
8	RESERVED	-	Reserved bits.
9			The mobile station shall add reserved bits as needed in order
10			to make the length of the entire message equal to an integer
11			number of octets. The mobile station shall set these bits
12			to '0'.

#### 6.7.2.3.2.9 Origination Continuation Message

When the mobile station sends an *Origination Continuation Message*, it shall use the following variable-length message format:

Field	Length (bits)
MSG_TYPE ('00001001')	8
ACK_SEQ	3
MSG_SEQ	3
ACK_REQ	1
ENCRYPTED	1
DIGIT_MODE	1
NUM_FIELDS	8

NUM\_FIELDS occurrences of the following field:

CHAR <sub>i</sub>	4 or 8
-------------------	--------

RESERVED	0 - 7 (as needed)
----------	-------------------

MSG\_TYPE - Message type.

The mobile station shall set this field to '00001001'.

ACK\_SEQ - Acknowledgement sequence number.

See 6.7.2.3.1.1.

MSG\_SEQ - Message sequence number.

See 6.7.2.3.1.1.

ACK\_REQ - Acknowledgement required indicator.

See 6.7.2.3.1.1.

ENCRYPTED - Message encryption indicator.

See 6.7.2.3.1.2.

DIGIT\_MODE - Digit mode indicator.

The mobile station shall set this field to the DIGIT\_MODE value from the Access Channel *Origination Message* for which this message is a continuation.

NUM\_FIELDS - Number of dialed digits in this message.

The mobile station shall set this field to the number of dialed digits included in this message.

- 1                   CHARi     -   A dialed digit or character.
- 2                               The mobile station shall include NUM\_FIELDS occurrences of
- 3                               this field. The mobile station shall include occurrences of this
- 4                               field for all dialed digits after those sent in the Access Channel
- 5                               *Origination Message* of which this message is a continuation.
- 6                               If the DIGIT\_MODE field is set to '0', the mobile station shall
- 7                               set each occurrence of this field to the code value shown in
- 8                               Table 6.7.1.3.2.4-5 corresponding to the dialed digit. If the
- 9                               DIGIT\_MODE field is set to '1', the mobile station shall set
- 10                              each occurrence of this field to the ASCII representation
- 11                              corresponding to the dialed digit, as specified in ANSI X3.4,
- 12                              with the most significant bit set to '0'.
- 13                   RESERVED   -   Reserved bits.
- 14                              The mobile station shall add reserved bits as needed in order
- 15                              to make the length of the entire message equal to an integer
- 16                              number of octets. The mobile station shall set these bits
- 17                              to '0'.

## 6.7.2.3.2.10 Handoff Completion Message

When the mobile station sends a *Handoff Completion Message*, it shall use the following variable-length message format:

Field	Length (bits)
MSG_TYPE ('00001010')	8
ACK_SEQ	3
MSG_SEQ	3
ACK_REQ	1
RESERVED	1
LAST_HDM_SEQ	2
NUM_PILOTS	4

NUM\_PILOTS occurrences of the following field:

PILOT_PN	9
----------	---

RESERVED	0 - 7 (as needed)
----------	-------------------

- MSG\_TYPE - Message type.  
The mobile station shall set this field to '00001010'.
- ACK\_SEQ - Acknowledgement sequence number.  
See 6.7.2.3.1.1.
- MSG\_SEQ - Message sequence number.  
See 6.7.2.3.1.1.
- ACK\_REQ - Acknowledgement required indicator.  
See 6.7.2.3.1.1.
- RESERVED - Reserved bit.  
This field takes the place of the ENCRYPTED field.  
The mobile station shall set this field to '0'.
- LAST\_HDM\_SEQ - *Handoff Direction Message* sequence number.  
The mobile station shall set this field to the value of the HDM\_SEQ field from the *Handoff Direction Message* that determined the current Active Set.
- NUM\_PILOTS - Number of pilots reported.  
The mobile station shall set this field to the number of pilots in the current Active Set.

1	<b>PILOT_PN</b>	-	Pilot PN sequence offset.
2			The mobile station shall include one occurrence of this field
3			for each pilot in the current Active Set. The mobile station
4			shall set this field to the pilot PN sequence offset, relative to
5			the zero offset pilot PN sequence in units of 64 PN chips, for
6			this pilot.
7	<b>RESERVED</b>	-	Reserved bits.
8			The mobile station shall add reserved bits as needed in order
9			to make the length of the entire message equal to an integer
10			number of octets. The mobile station shall set these bits
11			to '0'.

#### 6.7.2.3.2.11 Parameters Response Message

When the mobile station sends a *Parameters Response Message*, it shall use the following variable-length message format:

Field	Length (bits)
MSG_TYPE ('00001011')	8
ACK_SEQ	3
MSG_SEQ	3
ACK_REQ	1
ENCRYPTED	1

One or more occurrences of the following record:

PARAMETER_ID	16
PARAMETER_LEN	10
PARAMETER	PARAMETER_LEN + 1

RESERVED	0 - 7 (as needed)
----------	-------------------

MSG\_TYPE - Message type.

The mobile station shall set this field to '00001011'.

ACK\_SEQ - Acknowledgement sequence number.

See 6.7.2.3.1.1.

MSG\_SEQ - Message sequence number.

See 6.7.2.3.1.1.

ACK\_REQ - Acknowledgement required indicator.

See 6.7.2.3.1.1.

ENCRYPTED - Message encryption indicator.

See 6.7.2.3.1.2.

The mobile station shall include one occurrence of the following three-field record for each occurrence of the PARAMETER\_ID field in the Forward Traffic Channel *Retrieve Parameters Message* to which this message is a response. See Appendix E.

PARAMETER\_ID - Parameter identification.

The mobile station shall set this field to the value of the PARAMETER\_ID field for this parameter from the *Retrieve Parameters Message* to which this message is a response.



1	PARAMETER_LEN	-	Parameter length.
2			The mobile station shall set this field to the length shown in
3			Table E-1 corresponding to this PARAMETER_ID.
4	PARAMETER	-	Parameter value.
5			The mobile station shall set this parameter as specified in
6			Appendix E for this value of PARAMETER_ID.
7			
8	RESERVED	-	Reserved bits.
9			The mobile station shall add reserved bits as needed in order
10			to make the length of the entire message equal to an integer
11			number of octets. The mobile station shall set these bits
12			to '0'.

### 6.7.3 Orders

Order Messages are sent by the mobile station on the Access Channel and on the Reverse Traffic Channel. The general format used on the Access Channel is defined in 6.7.1.3.2.2, and the general format used on the Reverse Traffic Channel is defined in 6.7.2.3.2.1. There are many specific types of *Order Message*, as shown in Table 6.7.3-1.

The mobile station may send on the Access Channel any type of order shown in Table 6.7.3-1 with a 'Y' in the first column, but shall not send on the Access Channel any type of order with an 'N' in the first column. The mobile station may send on the Reverse Traffic Channel any type of order shown in Table 6.7.3-1 with a 'Y' in the second column, but shall not send on the Reverse Traffic Channel any type of order with an 'N' in the second column. The mobile station shall be capable of sending all types of orders shown in Table 6.7.3-1 with a 'Y' in the sixth column.

An order consists of an order code and order-specific fields. The order-specific fields consist of an order qualification code (ORDQ) and zero or more additional order-specific fields. The mobile station shall set the ORDER field in the *Order Message* to the order code shown in Table 6.7.3-1 corresponding to the type of order being sent.

If the order qualification code is '00000000' and there are no other additional fields as shown in Table 6.7.3-1 by an 'N' in the fifth column, the mobile station shall include no order-specific fields in the *Order Message*. The order qualification code of such a message is implicitly '00000000'.

If the order qualification code is not '00000000' and there are no other additional fields as shown in Table 6.7.3-1 by an 'N' in the fifth column, the mobile station shall include the order qualification code as the only order-specific field in the *Order Message*.

If there are other additional fields as shown in Table 6.7.3-1 by a 'Y' in the fifth column, the mobile station shall include order-specific fields as specified in the corresponding subsection of this section.

1 **Table 6.7.3-1. Order and Order Qualification Codes Used on the Reverse Traffic**  
 2 **Channel and the Access Channel (Part 1 of 2)**

<b>Access Channel Order</b>	<b>Reverse Traffic Channel Order</b>	<b>Order Code, ORDER (binary)</b>	<b>Order Qualification Code, ORDQ (binary)</b>	<b>More Fields other than ORDQ</b>	<b>Support Req'd</b>	<b>Name/Function</b>
Y	Y	000010	00000000	Y	Y	<i>Base Station Challenge Order</i>
Y	Y	000011	00000000	N	Y	<i>SSD Update Confirmation Order</i>
Y	Y	000011	00000001	N	Y	<i>SSD Update Rejection Order</i>
N	Y	001011	00000000	N	N	<i>Request Analog Service Order</i>
Y	Y	010000	00000000	N	Y	<i>Mobile Station Acknowledgement Order</i>
N	Y	010011	00000000	Y	N	<i>Service Option Request Order (see 6.7.3.2)</i>
N	Y	010100	00000000	Y	Y	<i>Service Option Response Order (see 6.7.3.3)</i>
N	Y	010101	00000000	N	Y	<i>Release Order (normal release)</i>
N	Y	010101	00000001	N	Y	<i>Release Order (with power-down indication)</i>
N	Y	010111	00000000	N	N	<i>Long Code Transition Request Order (request public)</i>
N	Y	010111	00000001	N	N	<i>Long Code Transition Request Order (request private)</i>
N	Y	010111	00000010	N	Y	<i>Long Code Transition Response Order (use public)</i>
N	Y	010111	00000011	N	N	<i>Long Code Transition Response Order (use private)</i>
N	Y	011000	00000000	N	Y	<i>Connect Order</i>
N	Y	011001	0000nnnn	N	Y	<i>Continuous DTMF Tone Order (where 'nnnn' is the tone per Table 6.7.1.3.2.4-5).</i>

**Table 6.7.3-1. Order and Order Qualification Codes Used on the Reverse Traffic Channel and the Access Channel (Part 2 of 2)**

[illegible]

## 6.7.3.1 Base Station Challenge Order

When the mobile station sends a *Base Station Challenge Order*, it shall set the ENCRYPTED field to '0' and shall not encrypt the contents of the message. The mobile station shall use the following fixed-length format for the order-specific fields:

Order-Specific Field	Length (bits)
ORDQ	8
RANDBS	32

ORDQ - Order qualification code.

The mobile station shall set this field to '00000000'.

RANDBS - Random challenge data.

The mobile station shall set this field as specified in 6.3.12.1.9.

## 6.7.3.2 Service Option Request Order

When the mobile station sends a *Service Option Request Order*, it shall use the following fixed-length format for the order-specific fields:

Order-Specific Field	Length (bits)
ORDQ	8
SERVICE_OPTION	16

ORDQ - Order qualification code.

The mobile station shall set this field to '00000000'.

SERVICE\_OPTION - Service option.

The mobile station shall set this field to the service option code shown in Table A-1 corresponding to the requested or alternative service option.

### 6.7.3.3 Service Option Response Order

When the mobile station sends a *Service Option Response Order*, it shall use the following fixed-length format for the order-specific fields:

Order-Specific Field	Length (bits)
ORDQ	8
SERVICE_OPTION	16

ORDQ - Order qualification code.

The mobile station shall set this field to '00000000'.

SERVICE\_OPTION - Service option.

The mobile station shall set this field to the service option code shown in Table A-1 corresponding to the accepted service option, or to '0000000000000000' to reject the proposed service option. See 6.6.4.1.2.2.1.

#### 6.7.3.4 Mobile Station Reject Order

The *Mobile Station Reject Order* can be sent on either the Access Channel or the Reverse Traffic Channel. The mobile station shall use the following variable-length format for the order-specific fields:

Order-Specific Field	Length (bits)
ORDQ	8
MSG_TYPE	8
ORDER	0 or 8
ORDQ	0 or 8

**ORDQ** - Order qualification code.

The mobile station shall set this field to the ORDQ value shown in Table 6.7.3-1 corresponding for the reason for rejecting the message.

**MSG\_TYPE** - Message type of rejected message.

The mobile station shall set this field to the value of the MSG\_TYPE field of the message being rejected.

**ORDER** - Order type of rejected message.

If the rejected message was an order message, the mobile station shall set this field to the value of the ORDER field in the rejected message. If the rejected message was not an order message, the mobile station shall omit this field.

**ORDQ** - Order qualification code of rejected message.

If the rejected message was an order message including an ORDQ field, the mobile station shall set this field to the value of the ORDQ field in the rejected message. If the rejected message was an order message not including an ORDQ field, the mobile station shall set this field to '00000000'. If the rejected message was not an order message, the mobile station shall omit this field.



#### 6.7.4 Reverse Traffic Channel Information Records

On the Reverse Traffic Channel, information records may be included in the *Flash with Information Message* or the *Status Message*. Table 6.7.4-1 lists the information record type values that may be used with each message type. The following sections describe the contents of each of the record types in detail.

**Table 6.7.4-1. Information Record Types**

Message Type	Information Record	Record Type (binary)
None	Reserved	00000001
Flash	Feature Indicator	00000010
Flash	Keypad Facility	00000011
Flash	Called Party Number	00000100
Flash	Calling Party Number	00000101
Status	Identification	00000110
Status	Call Mode	00000111
Status	Terminal Information	00001000
Status	MIN Information	00001001
Status	Security Status	00001010
Flash	Connected Number	00001011
All other record type values are reserved.		

#### 6.7.4.1 Feature Indicator

This information record allows the user to invoke supplementary services and features. The mobile station shall use the following fixed-length format for the type-specific fields:

Type-Specific Field	Length (bits)
FEATURE	4
RESERVED	4

**FEATURE** - Feature identifier.

This field identifies the supplementary service or feature to be invoked. Definition of the values for this field is left to the manufacturers and system operators.

The mobile station shall set this field to the feature identifier.

**RESERVED** - Reserved bits.

The mobile station shall set this field to '0000'.

## 6.7.4.2 Keypad Facility

This information record allows the user to send characters entered via a keyboard or other such terminal. The mobile station shall use the following variable-length format for the type-specific fields:

Type-Specific Field	Length (bits)
One or more occurrences of the following field:	
CHARi	8
RESERVED	0

CHARi - Character.

The mobile station shall include one occurrence of this field for each character entered. The mobile station shall set each occurrence of this field to the ASCII representation corresponding to the character entered, as specified in ANSI X3.4, with the most significant bit set to '0'.

RESERVED - Reserved bits.

The mobile station shall omit this field.

### 6.7.4.3 Called Party Number

This information record identifies the called party's number. The mobile station shall use the following variable-length format for the type-specific fields:

Type-Specific Field	Length (bits)
NUMBER_TYPE	3
NUMBER_PLAN	4

Zero or more occurrences of the following field:

CHARi	8
-------	---

RESERVED	1
----------	---

NUMBER\_TYPE - Type of number.

The mobile station shall set this field to the NUMBER\_TYPE value shown in Table 6.7.1.3.2.4-3 corresponding to the type of the called number, as defined in ANSI T1.607 §4.5.9.

NUMBER\_PLAN - Numbering plan.

The mobile station shall set this field to the NUMBER\_PLAN value shown in Table 6.7.1.3.2.4-4 corresponding to the numbering plan used for the called number, as defined in ANSI T1.607 §4.5.9.

CHARi - Character.

The mobile stations shall include one occurrence of this field for each character in the called number. The mobile station shall set each occurrence of this field to the ASCII representation corresponding to the character, as specified in ANSI X3.4, with the most significant bit set to '0'.

RESERVED - Reserved bits.

The mobile station shall set this field to '0'.

#### 6.7.4.4 Calling Party Number

This information record identifies the calling party's number. The mobile station shall use the following variable-length format for the type-specific fields:

Type-Specific Field	Length (bits)
NUMBER_TYPE	3
NUMBER_PLAN	4
PI	2
SI	2

Zero or more occurrences of the following field:

CHARi	8
-------	---

RESERVED	5
----------	---

NUMBER\_TYPE - Type of number.

The mobile station shall set this field to the NUMBER\_TYPE value shown in Table 6.7.1.3.2.4-3 corresponding to the type of the calling number as defined in ANSI T1.607 §4.5.9.

NUMBER\_PLAN - Numbering plan.

The mobile station shall set this field to the NUMBER\_PLAN value shown in Table 6.7.1.3.2.4-4 corresponding to the numbering plan used for the calling number, as defined in ANSI T1.607 §4.5.9.

PI - Presentation indicator.

This field indicates whether or not the calling number should be displayed.

The mobile station shall set this field to the PI value shown in Table 6.7.4.4-1 corresponding to the presentation indicator as defined in ANSI T1.607 §4.5.9.

**Table 6.7.4.4-1. Presentation Indicators**

<b>Description</b>	<b>PI (binary)</b>
Presentation allowed	00
Presentation restricted	01
Number not available	10
Reserved	11

SI - Screening indicator.

This field indicates how the calling number was screened.

The mobile station shall set this field to the SI value shown in Table 6.7.4.4-2 corresponding to the screening indicator value as defined in ANSI T1.607 §4.5.9.

**Table 6.7.4.4-2. Screening Indicators**

<b>Description</b>	<b>SI (binary)</b>
User-provided, not screened	00
User-provided, verified and passed	01
User-provided, verified and failed	10
Network-provided	11

CHARi - Character.

The mobile stations shall include one occurrence of this field for each character in the calling number. The mobile station shall set each occurrence of this field to the ASCII representation corresponding to the character, as specified in ANSI X3.4, with the most significant bit set to '0'.

RESERVED - Reserved bits.

The mobile station shall set this field to '00000'.

#### 6.7.4.5 Identification

This information record can be included in a *Status Message* to return the mobile station's ESN and MIN list. The mobile station shall use the following variable-length format for the type-specific fields:

Type-Specific Field	Length (bits)
---------------------	---------------

One or more occurrences of the following record:

MIN1	24
MIN2	10
HOME_SID	15
MOB_TERM	1

RESERVED	0-7 (as needed)
----------	-----------------

The mobile station shall include one occurrence of the following two-field record for each MIN it is actively supporting.

- |          |   |  |
|----------|---|--|
| MIN1     | - | First part of the mobile station identification number (MIN).<br>The mobile station shall set this field to the MIN1 value for the MIN specified by this record.   |
| MIN2     | - | Second part of the mobile station identification number (MIN).<br>The mobile station shall set this field to the MIN2 value for the MIN specified by this record.  |
| HOME_SID | - | Home system identification.<br>The mobile station shall set this field to the SID of the home cellular system for the MIN specified by this record.  |
| MOB_TERM | - | Mobile terminated calls accepted indicator.<br>If the MIN specified by this record is configured to accept mobile terminated calls while operating with the current roaming status (see 6.6.5.3), the mobile station shall set this bit to '1'. Otherwise, the mobile station shall set this bit to '0'. |
| RESERVED | - | Reserved bits.<br>The mobile station shall add reserved bits as needed in order to make the length of the entire message equal to an integer number of octets. The mobile station shall set these bits to '0'.   |

#### 6.7.4.6 Call Mode

This information record can be included in a *Status Message* to return the mobile station's preferred call mode and call-related information. The mobile station shall use the following fixed-length format for the type-specific fields:

Type-Specific Field	Length (bits)
ORIG_MODE	1
PRI_SERVICE	16
SEC_SERVICE	16
RESERVED	7

**ORIG\_MODE** - Origination mode indicator.

If the current call is a mobile-originated call, the mobile station shall set this field to '0'. If the current call is a mobile-terminated call, the mobile station shall set this field to '1'.

**PRI\_SERVICE** - Primary service option.

The mobile station shall set this field to the value shown in Table A-1 corresponding to the current primary service option. If no primary service option is active, the mobile station shall set this field to '0000000000000000'.

**SEC\_SERVICE** - Secondary service option.

The mobile station shall set this field to the value shown in Table A-1 corresponding to the current secondary service option. If no secondary service option is active, the mobile station shall set this field to '0000000000000000'.

**RESERVED** - Reserved bits.

The mobile station shall set this field to '0000000'.



#### 6.7.4.7 Terminal Information

This information record can be included in a *Status Message* to return configuration information about the mobile station. The mobile station shall use the following variable-length format for the type-specific fields:

Type-Specific Field	Length (bits)
MOB_CAI_REV	8
MOB_MFG_CODE	8
MOB_MODEL	8
MOB_FIRM_REV	16
SCM	8
LOCAL_CTRL	1
SLOT_CYCLE_INDEX	3

One or more occurrences of the following field:

SERVICE_OPTION	16
----------------	----

RESERVED	4
----------	---

MOB\_CAI\_REV - CAI revision of the mobile station.

The mobile station shall set this field to '00000001'.

MOB\_MFG\_CODE - Manufacturer code.

This field identifies the manufacturer of the mobile station.

The mobile station shall set this field to the manufacturer code assigned to its manufacturer.

MOB\_MODEL - Model number.

This number is assigned by the manufacturer for a particular model.

The mobile station shall set this field to the model number assigned by the manufacturer for this mobile station.

MOB\_FIRM\_REV - Firmware revision number.

This number is assigned by the manufacturer for a particular firmware version.

The mobile station shall set this field to the revision number assigned by the manufacturer for the firmware version running in this mobile station.

1	SCM	-	Station class mark.
2			The mobile station shall set this field to its station class mark.
3			See 2.3.3.
4	LOCAL_CTRL	-	Local control indicator.
5			If local control is enabled, the mobile station shall set this
6			field to '1'. If local control is disabled, the mobile station shall
7			set this field to '0'.
8	SLOT_CYCLE_INDEX	-	Slot cycle mode.
9			If the mobile station is operating in non-slotted mode, it shall
10			set this field to '000'. If the mobile station is operating in
11			slotted mode, it shall set this field to the SLOT_CYCLE_INDEX
12			value in use. See 6.6.2.1.1.
13	SERVICE_OPTION	-	Supported service option.
14			The mobile station shall include one occurrence of this field
15			for each service option supported by the mobile station. The
16			mobile station shall set this field to the value shown in
17			Table A-1 corresponding to the supported service option.
18	RESERVED	-	Reserved bits.
19			The mobile station shall set this field to '0000'.

#### 6.7.4.8 MIN Information

This information record can be included in a *Status Message* to return MIN-related configuration information about the mobile station. Each record of this type returns information for one MIN. The mobile station shall use the following variable-length format for the type-specific fields:

Type-Specific Field	Length (bits)
MIN1	24
MIN2	10
ACCOLC	4
MOB_TERM_HOME	1
MOB_TERM_FOR_SID	1
MOB_TERM_FOR_NID	1
HOME_SID	15

Zero or more occurrences of the following record:

SID	15
NID	16

RESERVED	0-7 (as needed)
----------	-----------------

- MIN1 - First part of the mobile station identification number (MIN).  
The mobile station shall set this field to the MIN1 value for the MIN specified by this record.
- MIN2 - Second part of the mobile station identification number (MIN).  
The mobile station shall set this field to the MIN2 value for the MIN specified by this record.
- ACCOLC - Overload class.  
The mobile station shall set this field to the access overload class assigned to the mobile station for this MIN.
- MOB\_TERM\_HOME - Home registration enable indicator.  
If the mobile station is configured to receive mobile station terminated calls when using a home (SID,NID) pair, the mobile station shall set this field to '1'. Otherwise, the mobile station shall set this field to '0'. See 6.6.5.3.

1	MOB_TERM_FOR_SID	-	Foreign SID roaming registration enable indicator.
2			If the mobile is configured to receive mobile station terminated
3			calls when it is a foreign SID roamer, the mobile station shall
4			set this field to '1'. Otherwise, the mobile station shall set this
5			field to '0'. See 6.6.5.3.
6	MOB_TERM_FOR_NID	-	Foreign NID roaming registration enable indicator.
7			If the mobile is configured to receive mobile station terminated
8			calls when it is a foreign NID roamer, the mobile station shall
9			set this field to '1'. Otherwise, the mobile station shall set this
10			field to '0'. See 6.6.5.3.
11	HOME_SID	-	Home system identification.
12			The mobile station shall set this field to the SID of the home
13			cellular system for the MIN specified by this record.
14			
15	The mobile station shall include one occurrence of the following two-field record for each		
16	home (SID, NID) pair for this MIN:		
17	SID	-	System identification.
18			The mobile station shall set this field to the SID value for this
19			(SID, NID) pair.
20	NID	-	Network identification.
21			The mobile station shall set this field to the NID value for this
22			(SID, NID) pair.
23			
24	RESERVED	-	Reserved bits.
25			The mobile station shall add reserved bits as needed in order
26			to make the length of the entire information record equal to an
27			integer number of octets. The mobile station shall set these
28			bits to '0'.

#### 6.7.4.9 Security Status

This information record can be included in a *Status Message* to return the authentication, encryption, and voice privacy modes of the mobile station. The mobile station shall use the following fixed-length format for the type-specific fields:

Type-Specific Field	Length (bits)
AUTH_MODE	2
ENCRYPT_MODE	4
PRIVATE_LCM	1
RESERVED	1

**AUTH\_MODE** - Authentication mode.

If the mobile station provided standard authentication information at the initiation of this call, the mobile station shall set this field to '01'. Otherwise, the mobile station shall set this field to '00'. All other values are reserved.

**ENCRYPT\_MODE** - Message encryption mode.

The mobile station shall set this field to the value shown in Table 7.7.2.3.2.8-2 corresponding to the message encryption mode currently in use for this call.

**PRIVATE\_LCM** - Private long code mask indicator.

If the mobile station is using the private long code mask for this call, the mobile station shall set this field to '1'. If the mobile station is using the public long code mask for this call, the mobile station shall set this field to '0'.

**RESERVED** - Reserved bits.

The mobile station shall set this field to '0'.

#### 6.7.4.10 Connected Number

This information record identifies the responding party to a call. The mobile station shall use the following variable-length format for the type-specific fields:

Type-Specific Field	Length (bits)
NUMBER_TYPE	3
NUMBER_PLAN	4
PI	2
SI	2

Zero or more occurrences of the following field:

CHARi	8
-------	---

RESERVED	1
----------	---

**NUMBER\_TYPE** - Type of number.

The mobile station shall set this field to the NUMBER\_TYPE value shown in Table 6.7.1.3.2.4-3 corresponding to the type of the connected number as defined in ANSI T1.607 §4.5.9.

**NUMBER\_PLAN** - Numbering plan.

The mobile station shall set this field to the NUMBER\_PLAN value shown in Table 6.7.1.3.2.4-4 corresponding to the numbering plan used for the connected number, as defined in ANSI T1.607 §4.5.9.

**PI** - Presentation indicator.

This field indicates whether or not the connected number should be displayed. The mobile station shall set this field to the PI value shown in Table 6.7.4.4-1 corresponding to the presentation indicator as defined in ANSI T1.607 §4.5.9.

**SI** - Screening indicator.

This field indicates how the connected number was screened. The mobile station shall set this field to the SI value shown in Table 6.7.4.4-2 corresponding to the screening indicator value as defined in ANSI T1.607 §4.5.9.

**CHARi** - Character.

The mobile station shall include one occurrence of this field for each character in the connected number. The mobile station shall set each occurrence of this field to the ASCII representation corresponding to the character, as specified in ANSI X3.4, with the most significant bit set to '0'.

- 1                **RESERVED**        -    Reserved bits.
- 2                                The mobile station shall set this field to '0'.

1

2

3 No text.

4