



1 **Loopback Service Options (LSO) for cdma2000**
2 **Spread Spectrum Systems**

3 **Revision B**

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1 Revision History

Revision	Description of Changes	Date
Rev 0 v1.0	Publication	
Rev A v1.0	Added LSO for new SO's	
Rev B v1.0	Rev E cdma2000 LSO	January 2011

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FOREWORD

(This foreword is not part of this Standard)

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This Standard was prepared by Technical Specification Group C of the Third Generation Partnership Project 2 (3GPP2). This Standard specifies procedures for the Loopback Service Option (LSO) for cdma2000 Spread Spectrum Systems.

FOREWORD

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NOTES

- 1 1. “Base station” refers to the functions performed on the landline side, which are
2 typically distributed among a cell, a sector of a cell, and a mobile switching center.
- 3 2. This Standard uses the following verbal forms: “Shall” and “shall not” identify
4 requirements to be followed strictly to conform to the standard and from which no
5 deviation is permitted. “Should” and “should not” indicate that one of several
6 possibilities is recommended as particularly suitable, without mentioning or
7 excluding others; that a certain course of action is preferred but not necessarily
8 required; or that (in the negative form) a certain possibility or course of action is
9 discouraged but not prohibited. “May” and “need not” indicate a course of action
10 permissible within the limits of the standard. “Can” and “cannot” are used for
11 statements of possibility and capability, whether material, physical, or causal.
- 12 3. Unless indicated otherwise, this document presents numbers in decimal form.
13 Binary numbers are distinguished in the text by the use of single quotation marks.

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1 GENERAL

1.1 Scope

This Standard specifies procedures for the Loopback Service Option (LSO) for cdma2000 Spread Spectrum Systems.

1.2 Terms and Numeric Information

Base Station. A fixed station used for communicating with mobile stations. Depending upon the context, the term base station may refer to a cell, a sector within a cell, or another part of the wireless system.

Blank-and-burst. The preemption of the traffic in an entire traffic channel frame by another form of traffic, typically signaling.

Data Block. The unit of data exchanged between the multiplex sublayer and the MSO.

Dim-and-burst. A frame in which primary traffic is multiplexed with secondary, signaling, or secondary and signaling traffic.

Forward Fundamental Code Channel. A portion of a Forward Traffic Channel which carries a combination of higher-level data and power control information.

Forward Supplemental Code Channel. A portion of a Forward Traffic Channel which operates in conjunction with a Forward Fundamental Code Channel in that Forward Traffic Channel, and (optionally) with other Forward Supplemental Code Channels to provide higher data rate services, and on which higher-level data is transmitted.

Forward Traffic Channel. A code channel used to transport user and signaling traffic from a base station to a mobile station.

Fundamental Channel. A portion of a Forward or Reverse Traffic Channel which carries a combination of higher-level data and power control information.

Fundamental Code Channel. A portion of a Forward or Reverse Traffic Channel which carries a combination of higher-level data and power control information (specific to IS-95B systems).

Mobile Station. A station intended to be used while in motion or during halts at unspecified points. Mobile stations include portable units (e.g., hand-held personal units) and units installed in vehicles.

Multiplex Option. The ability of the multiplex sublayer and lower layers to be tailored to provide special capabilities. A multiplex option defines such characteristics as the frame format and rate decision rules (see also Multiplex Sublayer).

Multiplex Sublayer. One of the conceptual layers of the system that multiplexes and demultiplexes primary traffic, secondary traffic, and signaling traffic (see [3]).

P_REV. Protocol revision level supported by a base station.

Primary Traffic. Data bits from a service that has the traffic type in the Service Configuration Record set to Primary.

1 **Radio Configuration (RC).** A set of Forward Traffic Channel and Reverse Traffic Channel
2 transmission formats that are characterized by physical layer parameters, such as
3 transmission rates, modulation characteristics, and spreading rate.

4 **RC.** See Radio configuration.

5 **Reverse Fundamental Code Channel.** A portion of a Reverse Traffic Channel that carries
6 a combination of higher-level data and power control information.

7 **Reverse Traffic Channel.** A Reverse CDMA Channel used to transport user and signaling
8 traffic from a single mobile station to one or more base stations.

9 **Secondary Traffic.** Data bits from a service that has the traffic type in the Service
10 Configuration Record set to Secondary.

11 **Service Option.** A service capability of the system. Service options may be applications
12 such as voice, data, or facsimile etc.

13 **Signaling Traffic.** Control messages that are carried between mobile station and the base
14 station on the Traffic Channel.

15 1.3 References

16 **Nomative references:**

17 The following standards contain provisions which, through reference in this text, constitute
18 provisions of this Standard. At the time of publication, the editions indicated were valid. All
19 standards are subject to revision, and parties to agreements based on this Standard are
20 encouraged to investigate the possibility of applying the most recent editions of the
21 standards indicated below.

- 23 1. *3GPP2 C.S0010-D v1.0, Recommended Minimum Performance Standards for*
24 *cdma2000 Spread Spectrum Base Stations, Sept 2010.*
- 25 2. *3GPP2 C.S0011-C v2.0, Recommended Minimum Performance Standards for*
26 *cdma2000 Spread Spectrum Mobile Stations, March 2006.*
- 27 3. *3GPP2 C.S0003-E v2.0, Medium Access Control (MAC) Standard for cdma2000*
28 *Spread Spectrum Systems, June 2010.*
- 29 4. *3GPP2 C.S0005-E v2.0, Upper Layer (Layer 3) Signaling Standard for cdma2000*
30 *Spread Spectrum Systems, June 2010.*
- 31 5. *3GPP2 C.S0008-0 v1.0, Multi-Carrier Specification for Spread Spectrum Systems on*
32 *GSM MAP (MC-MAP) (Lower Layers Air Interface), July 2000.*
- 33 6. *3GPP2 C.S0002-E v2.0, Physical Layer Standard for cdma2000 Spread Spectrum*
34 *Systems, June 2010.*

35 **Informative references:**

36 The document does not have informative references.

2 SERVICE OPTION 2, 9, 30, 31, 55, AND 75

2.1 General Description

Service Options 2, 9, 30, 31, 55, and 75 are defined in this document.

Service Option 2 and 9 allow testing of the Fundamental Code Channel for systems with RC 1 and RC 2, respectively. Service Option 30 and 31 allow testing of the Forward Supplemental Code Channel for systems with RC 1 and RC 2, respectively. Service Option 75 allows testing of the Fundamental Channel for systems with Forward RC 11 or 12 and Reverse RC 8.

Service Option 55 allows testing of the Fundamental Channel for systems with all radio configurations except forward RC 11 or 12 and Reverse RC 8, and with P_REV equal to 6 or higher. Based on the service option number 55 and the preferred RC indicated during call set-up, the correct multiplex option can be derived without ambiguity. When Service Option 55 is used with Multiplex Option 0x01, most of the mobile station procedures for Service Option 2 apply. When Service Option 55 is used with Multiplex Option 0x02, most of the mobile station procedures for Service Option 9 apply.

These service options provide a loopback of primary traffic information bits through the mobile station. These service options provide the means for a base station to supply a known data stream on both the Forward and Reverse Traffic Channels so that a mobile station's receiving and transmitting performance can be measured. In addition, these service options provide a convenient means of setting up calls and generating traffic for system testing. Specifically, these service options are used in some of the tests specified in [1] and [2].

For each Forward Traffic Channel frame, the base station generates and sends one or more primary data blocks to the mobile station, consisting of one forward fundamental data block and up to one forward supplemental data block. After a delay to allow for processing, the mobile station sends one reverse fundamental data block back to the base station. The base station can then check the forward fundamental data block, forward supplemental data block or reverse fundamental data block for correctness.

The base station can generate data block sizes of 171, 80, 40, 16, or 0 bits (for Multiplex Option 0x01 primary traffic) or 266, 124, 54, 20, or 0 bits (for Multiplex Option 0x02 primary traffic). The base station can generate a data block size of 171 bits (for Multiplex Option 0x03 primary traffic) or 266 bits (for Multiplex Option 0x04 primary traffic). The base station uses a data block size of 0 bits for blank-and-burst transmissions. The base station can generate any of the data block sizes associated with the current multiplex option in each frame without regard to the data block size that was generated in the previous frame. The base station can set the bits within a data block to any desired value; however, to obtain satisfactory measurements of performance, the base station should set these bits randomly and vary the bits from data block to data block.

The Loopback service options allow for simultaneous normal operation of signaling messages and secondary traffic.

The mobile station generates the primary fundamental data block for the Reverse Traffic Channel from the received forward fundamental data block or forward supplemental data block, depending upon the multiplex option. The mobile station replaces the first two bits of the data block with frame categorization information obtained from the Forward Traffic Channel, so that the base station can obtain information about the quality of the Forward Traffic Channel.

2.2 Service Option Numbers

For systems with P_REV equal to 5 or lower, the service option described by this standard shall use service option number 2 and is called Service Option 2 when using the Forward Fundamental Code Channel with Multiplex Option 1. It shall use service option number 9 and is called Service Option 9 when using the Forward Fundamental Code Channel with Multiplex Option 0x02. It shall use service option number 30 and is called Service Option 30 when using the Forward Supplemental Code Channel with Multiplex Option 0x03. It shall use service option number 31 and is called Service Option 31 when using the Forward Supplemental Code Channel with Multiplex Option 0x04.

For systems with P_REV equal to 6 or higher, the service option described by this standard shall use service option number 55 and is called Service Option 55. The multiplex option in use can be either 0x01 or 0x02 depending upon the RC configured based on Table 2.2-1.

Table 2.2-1. Multiplex Option in use for Service Option 55

Multiplex Option in use	Forward Fundamental Channel RC	Reverse Fundamental Channel RC
0x01	1, 3, 4, 6, or 7	1, 3, or 5
0x02	2, 5, 8, or 9	2, 4, or 6

2.3 Multiplex Option

2.3.1 Required Multiplex Option Support

2.3.1.1 Service Option 2

Service Option 2 shall support an interface with Multiplex Option 0x01. Service Option 2 data blocks shall only be transported as primary traffic on the Forward and Reverse Fundamental Code Channels. Data block transport between Service Option 2 and Multiplex Option 0x01 shall ensure that the leftmost bit of a Service Option 2 data block (as defined in 2.4.1) shall correspond to the leftmost bit of the primary fundamental data block.

2.3.1.2 Service Option 9

Service Option 9 shall support an interface with Multiplex Option 0x02. Service Option 9 data blocks shall only be transported as primary traffic on the Forward and Reverse Fundamental Code Channels. Data block transport between Service Option 9 and Multiplex Option 0x02 shall ensure that the leftmost bit of a Service Option 9 data block

1 (as defined in 2.4.2) shall correspond to the leftmost bit of the primary fundamental data
2 block .

3 2.3.1.3 Service Option 30

4 Service Option 30 shall support an interface with Multiplex Option 0x03. Service Option 30
5 data blocks shall only be transported as primary traffic on the Forward Supplemental Code
6 Channel and Reverse Fundamental Code Channel. Data block transport between Service
7 Option 30 and Multiplex Option 0x03 shall ensure that the leftmost bit of a Service Option
8 30 data block (as defined in 2.4.3) shall correspond to the leftmost bit of the primary
9 supplemental data block.

10 2.3.1.4 Service Option 31

11 Service Option 31 shall support an interface with Multiplex Option 0x04. Service Option 31
12 data blocks shall only be transported as primary traffic on the Forward Supplemental Code
13 Channel and Reverse Fundamental Code Channel. Data block transport between Service
14 Option 31 and Multiplex Option 0x04 shall ensure that the leftmost bit of a Service Option
15 31 data block (as defined in 2.4.4) shall correspond to the leftmost bit of the primary
16 supplemental data block.

17 2.3.1.5 Service Option 55

18 When Service Option 55 is used with Multiplex Option 0x01, the mobile station shall follow
19 the requirement in 2.3.1.1 for Service Option 2 as if Service Option 2 were used.

20 When Service Option 55 is used with Multiplex Option 0x02, the mobile station shall follow
21 the requirement in 2.3.1.1 for Service Option 9 as if Service Option 9 were used.

22 When Service Option 55 is used, any mentioning of Fundamental Code Channel shall be
23 regarded as Fundamental Channel.

24 2.3.1.6 Service Option 75

25 Service Option 75 shall support an interface with Multiplex Option 0x01. Service Option 75
26 data blocks shall only be transported as primary traffic on the Forward and Reverse
27 Fundamental Channels. Data block transport between Service Option 75 and Multiplex
28 Option 0x01 shall ensure that the leftmost bit of a Service Option 75 data block (as defined
29 in 2.4.6) shall correspond to the leftmost bit of the primary fundamental data block.

30 2.3.2 Interface to Multiplex Options

31 2.3.2.1 Service Option 2

32 2.3.2.1.1 Transmitted Fundamental Data Blocks

33 In the mobile station, Service Option 2 shall generate and shall supply exactly one
34 fundamental data block to the multiplex sublayer every 20 ms. The fundamental data block
35 shall be one of five types as shown in Table 2.3.2.1.1-1 and shall have an internal format
36 as specified in 2.4.1. The number of bits supplied to the multiplex sublayer for each type of
37 fundamental data block shall be as shown in Table 2.3.2.1.1-1. The data contained within

1 the generated fundamental data block shall be based upon the contents of the received
2 fundamental data block and shall be constructed per the requirements of 2.5.1.1.

3 Unless otherwise commanded, Service Option 2 shall supply a Rate 1, Rate 1/2, Rate 1/4
4 or Rate 1/8 fundamental data block. Upon command, Service Option 2 shall generate a
5 Blank fundamental data block. Also, upon command, Service Option 2 shall generate a
6 non-blank fundamental data block with a maximum rate of Rate 1/2.

7 **Table 2.3.2.1.1-1. Fundamental Data Block Types Supplied by Service Option 2 to the**
8 **Multiplex Sublayer**

Data Block Type	Bits per Data Block
Rate 1	171
Rate 1/2	80
Rate 1/4	40
Rate 1/8	16
Blank	0

9 A Rate 1 fundamental data block corresponds to a 9600 bps Fundamental Code Channel
10 frame with 171 primary fundamental data block bits. A Rate 1/2 fundamental data block
11 corresponds to a 4800 bps Fundamental Code Channel frame or to a dim-and-burst
12 Fundamental Code Channel frame with 80 primary fundamental data block bits. A Rate
13 1/4 fundamental data block corresponds to a 2400 bps Fundamental Code Channel frame
14 or to a dim-and-burst Fundamental Code Channel frame with 40 primary fundamental
15 data block bits. A Rate 1/8 fundamental data block corresponds to a 1200 bps
16 Fundamental Code Channel frame or to a dim-and-burst Fundamental Code Channel
17 frame with 16 primary fundamental data block bits. A Blank fundamental data block
18 corresponds to a blank-and-burst Fundamental Code Channel frame.

19 2.3.2.1.2 Received Fundamental Data Blocks

20 The multiplex sublayer in the mobile station categorizes every received Forward
21 Fundamental Code Channel frame (see [3]), and supplies the fundamental data block type
22 and accompanying bits, if any, to Service Option 2 as shown in Table 2.3.2.1.2-1. Service
23 Option 2 processes the bits of the fundamental data block as described in 2.5. The first five
24 received fundamental data block types shown in Table 2.3.2.1.2-1 correspond to the
25 transmitted fundamental data block types shown in Table 2.3.2.1.1-1. (The Blank
26 fundamental data block type occurs when the receiving station determines that a blank-
27 and-burst Fundamental Code Channel frame for signaling traffic or secondary traffic was
28 transmitted.) The Rate 1 with Bit Errors fundamental data block type occurs when the
29 receiving station determines that the Fundamental Code Channel frame was transmitted at
30 9600 bps and the Fundamental Code Channel frame has one or more bit errors. The
31 Insufficient Frame Quality fundamental data block type occurs when the mobile station is
32 unable to decide upon the data rate of the received Fundamental Code Channel frame or
33 when the mobile station detects a Fundamental Code Channel frame in error which does
34 not belong to the Rate 1 with Bit Errors fundamental data block type.

Table 2.3.2.1.2-1. Fundamental Data Block Types Supplied by the Multiplex Sublayer to Service Option 2

Data Block Type	Bits per Data Block
Rate 1	171
Rate 1/2	80
Rate 1/4	40
Rate 1/8	16
Blank	0
Rate 1 with Bit Errors	171
Insufficient Frame Quality (Erasure)	0

2.3.2.2 Service Option 9

2.3.2.2.1 Transmitted Fundamental Data Blocks

In the mobile station, Service Option 9 shall generate and shall supply exactly one fundamental data block to the multiplex sublayer every 20 ms. The fundamental data block shall be one of five types as shown in Table 2.3.2.2.1-1 and shall have an internal format as specified in 2.4.2. The number of bits supplied to the multiplex sublayer for each type of fundamental data block shall be as shown in Table 2.3.2.2.1-1. The data contained within the generated fundamental data block shall be based upon the contents of the received fundamental data block and shall be constructed per the requirements of 2.5.1.2.

Unless otherwise commanded, Service Option 9 shall supply a Rate 1, Rate 1/2, Rate 1/4 or Rate 1/8 fundamental data block. Upon command, Service Option 9 shall generate a Blank fundamental data block. Also upon command, Service Option 9 shall generate a non-blank fundamental data block with a maximum rate of Rate 1/2.

Table 2.3.2.2.1-1. Fundamental Data block Types Supplied by Service Option 9 to the Multiplex Sublayer

Data Block Type	Bits per Data Block
Rate 1	266
Rate 1/2	124
Rate 1/4	54
Rate 1/8	20
Blank	0

A Rate 1 fundamental data block corresponds to a 14400 bps Fundamental Code Channel frame with 266 primary fundamental data block bits. A Rate 1/2 fundamental data block corresponds to a 7200 bps Fundamental Code Channel frame or to a dim-and-burst Fundamental Code Channel frame with 124 primary fundamental data block bits. A Rate 1/4 fundamental data block corresponds to a 3600 bps Fundamental Code Channel frame or to a dim-and-burst Fundamental Code Channel frame with 54 primary fundamental

1 data block bits. A Rate 1/8 fundamental data block corresponds to an 1800 bps
 2 Fundamental Code Channel frame or to a dim-and-burst Fundamental Code Channel
 3 frame with 20 primary fundamental data block bits. A Blank fundamental data block
 4 corresponds to a blank-and-burst Fundamental Code Channel frame.

5 2.3.2.2.2 Received Fundamental Data Blocks

6 The multiplex sublayer in the mobile station categorizes every received Forward
 7 Fundamental Code Channel frame (see [3]), and supplies the fundamental data block type
 8 and accompanying bits, if any, to Service Option 9 as shown in Table 2.3.2.2.2-1. Service
 9 Option 9 processes the bits of the fundamental data block as described in 2.5. The first five
 10 received fundamental data block types shown in Table 2.3.2.2.2-1 correspond to the
 11 transmitted fundamental data block types shown in Table 2.3.2.2.2-1. (The Blank
 12 fundamental data block type occurs when the receiving station determines that a blank-
 13 and-burst Fundamental Code Channel frame for signaling traffic or secondary traffic was
 14 transmitted.) The Insufficient Frame Quality fundamental data block type occurs when the
 15 mobile station is unable to decide upon the data rate of the received Fundamental Code
 16 Channel frame or when the mobile station detects a frame in error.

17 **Table 2.3.2.2.2-1. Fundamental Data Block Types Supplied by the Multiplex Sublayer**
 18 **to Service Option 9**

Data Block Type	Bits per Data Block
Rate 1	266
Rate 1/2	124
Rate 1/4	54
Rate 1/8	20
Blank	0
Insufficient Frame Quality (Erasure)	0

19 2.3.2.3 Service Option 30

20 2.3.2.3.1 Transmitted Fundamental Data Blocks

21 In the mobile station, Service Option 30 shall generate and shall supply exactly one
 22 fundamental data block to the multiplex sublayer every 20 ms. The fundamental data block
 23 shall be one of four types as shown in Table 2.3.2.3.1-1 and shall have an internal format
 24 as specified in 2.4.3. The number of bits supplied to the multiplex sublayer for each type of
 25 fundamental data block shall be as shown in Table 2.3.2.3.1-1. The data contained within
 26 the generated fundamental data block shall be based upon the contents of the received
 27 supplemental data block and shall be constructed per the requirements of 2.5.1.3.

28 Unless otherwise commanded, Service Option 30 shall supply a Rate 1 fundamental data
 29 block. Upon command, Service Option 30 shall generate a Blank fundamental data block.
 30 Also upon command, Service Option 30 shall generate a non-blank fundamental data block
 31 with a maximum rate of Rate 1/2.

Table 2.3.2.3.1-1. Fundamental Data Block Types Supplied by Service Option 30 to the Multiplex Sublayer

Data Block Type	Bits per Data Block
Rate 1	171
Rate 1/2	80
Rate 1/8	16
Blank	0

A Rate 1 fundamental data block corresponds to a 9600 bps Fundamental Code Channel frame with 171 primary fundamental data block bits. A Rate 1/2 fundamental data block corresponds to a dim-and-burst Fundamental Code Channel frame with 80 primary fundamental data block bits. A Rate 1/8 fundamental data block corresponds to an 1200 bps Fundamental Code Channel frame or a dim-and-burst Fundamental Code Channel frame with 16 primary fundamental data block bits. A Blank fundamental data block corresponds to a blank-and-burst Fundamental Code Channel frame.

2.3.2.3.2 Received Supplemental Data Blocks

The multiplex sublayer in the mobile station categorizes every received Forward Supplemental Code Channel frame (see [3]), and supplies the supplemental data block type and accompanying bits, if any, to Service Option 30 as shown in Table 2.3.2.3.2-1. Service Option 30 processes the bits of the supplemental data block as described in 2.5. The first received supplemental data block type shown in Table 2.3.2.3.2-1 corresponds to the transmitted fundamental data block type shown in Table 2.3.2.3.1-1. The Insufficient Frame Quality supplemental data block type occurs when the mobile station detects a Forward Supplemental Code Channel frame in error or when the mobile station detects that a blank-and-burst Forward Supplemental Code Channel frame for secondary traffic was transmitted.

Table 2.3.2.3.2-1. Supplemental Data Block Types Supplied by the Multiplex Sublayer to Service Option 30

Data Block Type	Bits per Data Block
Rate 1	171
Insufficient Frame Quality (Erasure)	0

2.3.2.4 Service Option 31

2.3.2.4.1 Transmitted Fundamental Data Blocks

In the mobile station, Service Option 31 shall generate and shall supply exactly one fundamental data block to the multiplex sublayer every 20 ms. The fundamental data block shall be one of four types as shown in Table 2.3.2.4.1-1 and shall have an internal format as specified in 2.4.4. The number of bits supplied to the multiplex sublayer for each type of fundamental data block shall be as shown in Table 2.3.2.4.1-1. The data contained within

1 the generated fundamental data block shall be based upon the contents of the received
2 supplemental data block and shall be constructed per the requirements of 2.5.1.4.

3 Unless otherwise commanded, Service Option 31 shall supply a Rate 1 fundamental data
4 block. Upon command, Service Option 31 shall generate a Blank fundamental data block.
5 Also upon command, Service Option 31 shall generate a non-blank fundamental data block
6 with a maximum rate of Rate 1/2.

7 **Table 2.3.2.4.1-1. Fundamental Data Block Types Supplied by Service Option 31 to**
8 **the Multiplex Sublayer**

Data Block Type	Bits per Data Block
Rate 1	266
Rate 1/2	124
Rate 1/8	20
Blank	0

9 A Rate 1 fundamental data block corresponds to a 14400 bps Fundamental Code Channel
10 frame with 266 primary fundamental data block bits. A Rate 1/2 fundamental data block
11 corresponds to a dim-and-burst Fundamental Code Channel frame with 124 primary
12 fundamental data block bits. A Rate 1/8 fundamental data block corresponds to an 1800
13 bps Fundamental Code Channel frame or a dim-and-burst Fundamental Code Channel
14 frame with 20 primary fundamental data block bits. A Blank fundamental data block
15 corresponds to a blank-and-burst Fundamental Code Channel frame.

16 2.3.2.4.2 Received Supplemental Data Blocks

17 The multiplex sublayer in the mobile station categorizes every received Forward
18 Supplemental Code Channel frame (see [3]), and supplies the supplemental data block type
19 and accompanying bits, if any, to Service Option 31 as shown in Table 2.3.2.4.2-1. Service
20 Option 31 processes the bits of the supplemental data block as described in 2.5. The first
21 received supplemental data block type shown in Table 2.3.2.4.2-1 corresponds to the
22 transmitted fundamental data block type shown in Table 2.3.2.4.1-1. The Insufficient
23 Frame Quality supplemental data block type occurs when the mobile station detects a
24 Forward Supplemental Code Channel frame in error or when the mobile station detects
25 that a blank-and-burst Forward Supplemental Code Channel frame for secondary traffic
26 was transmitted.

1 **Table 2.3.2.4.2-1. Supplemental Data Block Types Supplied by the Multiplex Sublayer**
 2 **to Service Option 31**

Data Block Type	Bits per Data Block
Rate 1	266
Insufficient Frame Quality (Erasure)	0

3 2.3.2.5 Service Option 55

4 2.3.2.5.1 Transmitted Fundamental Data Blocks

5 If Multiplex Option 0x01 is used, the mobile station shall follow the descriptions of
 6 2.3.2.1.1 for Service Option 2 as if Service Option 2 were used.

7 If Multiplex Option 0x02 is used, the mobile station shall follow the descriptions of
 8 2.3.2.2.1 for Service Option 9 as if Service Option 9 were used.

9 2.3.2.5.2 Received Fundamental Data Blocks

10 If Multiplex Option 0x01 is used, the mobile station shall follow the descriptions of
 11 2.3.2.1.2 for Service Option 2 as if Service Option 2 were used.

12 If Multiplex Option 0x02 is used, the mobile station shall follow the descriptions of
 13 2.3.2.2.2 for Service Option 9 as if Service Option 9 were used.

14 2.3.2.6 Service Option 75

15 2.3.2.6.1 Transmitted Fundamental Data Blocks

16 In the mobile station, Service Option 75 shall generate and shall supply exactly one
 17 fundamental data block to the multiplex sublayer every 20 ms. The fundamental data block
 18 shall be one of six types as shown in Table 2.3.2.6.1-1 and shall have an internal format as
 19 specified in 2.4.1. The number of bits supplied to the multiplex sublayer for each type of
 20 fundamental data block shall be as shown in Table 2.3.2.6.1-1. The data contained within
 21 the generated fundamental data block shall be based upon the contents of the received
 22 fundamental data block and shall be constructed per the requirements of 2.5.1.1.

23 Unless otherwise commanded, Service Option 75 shall supply a Rate 1, Rate 1/2, Rate 1/4,
 24 Rate 1/8, or Rate 1/8 non-critical fundamental data block. Upon command, Service Option
 25 75 shall generate a Blank fundamental data block. Also, upon command, Service Option 75
 26 shall generate a non-blank fundamental data block with a maximum rate of Rate 1/2.

Table 2.3.2.6.1-1. Fundamental Data Block Types Supplied by Service Option 75 to the Multiplex Sublayer

Data Block Type	Bits per Data Block
Rate 1	171
Rate ½	80
Rate ¼	40
Rate 1/8	16
Rate 1/8 Non-critical	16
Blank	0

A Rate 1 fundamental data block corresponds to a 9600 bps Fundamental Channel frame with 171 primary fundamental data block bits. A Rate 1/2 fundamental data block corresponds to a 5000 bps Fundamental Channel frame or to a dim-and-burst Fundamental Channel frame with 80 primary fundamental data block bits. A Rate 1/4 fundamental data block corresponds to a 3000 bps Fundamental Channel frame or to a dim-and-burst Fundamental Channel frame with 40 primary fundamental data block bits. A Rate 1/8 fundamental data block corresponds to a 1800 bps Fundamental Channel frame or to a dim-and-burst Fundamental Channel frame with 16 primary fundamental data block bits. A Rate 1/8 Non-critical fundamental data block corresponds to a 0 bps Fundamental Channel frame or to a 1800 bps Fundamental Channel frame according to [6]. A Blank fundamental data block corresponds to a blank-and-burst Fundamental Channel frame.

2.3.2.6.2 Received Fundamental Data Blocks

The multiplex sublayer in the mobile station categorizes every received Forward Fundamental Channel frame (see [3]), and supplies the fundamental data block type and accompanying bits, if any, to Service Option 75 as shown in Table 2.3.2.6.2-1. Service Option 75 processes the bits of the fundamental data block as described in 2.5. The first five received fundamental data block types shown in Table 2.3.2.6.2-1 correspond to the transmitted fundamental data block types shown in Table 2.3.2.6.1-1. (The Blank fundamental data block type occurs when the receiving station determines that a blank-and-burst Fundamental Channel frame for signaling traffic or secondary traffic.) The Rate 1 with Bit Errors fundamental data block type occurs when the receiving station determines that the Fundamental Channel frame was transmitted at 9600 bps and the Fundamental Channel frame has one or more bit errors. The Insufficient Frame Quality fundamental data block type occurs when the mobile station is unable to decide upon the data rate of the received Fundamental Channel frame or when the mobile station detects a Fundamental Channel frame in error which does not belong to the Rate 1 with Bit Errors fundamental data block type.

Table 2.3.2.6.2-1. Fundamental Data Block Types Supplied by the Multiplex Sublayer to Service Option 75

Data Block Type	Bits per Data Block
Rate 1	171
Rate 1/2	80
Rate 1/4	40
Rate 1/8	16
Blank	0
Rate 1 with Bit Errors	171
Insufficient Frame Quality (Erasure)	0

2.3.3 Service Option Negotiation, Service Negotiation, and Activation

The mobile station and base station can negotiate for Service Option 2 using either service option negotiation (see 2.3.3.1) or service negotiation (see 2.3.3.2).

The mobile station and base station can negotiate for Service Options 9, 30 and 31 using service negotiation (see 2.3.3.2).

The mobile station and base station can negotiate for Service Option 55 and 75 using service negotiation (see 2.3.3.2).

2.3.3.1 Procedures Using Service Option Negotiation

The mobile station shall perform service option negotiation for Service Option 2 as described in [4]. The base station shall perform service option negotiation for Service Option 2 as described in [4].

Upon successfully completing negotiation for Service Option 2, the mobile station shall declare the service option to be active (set SO_CUR equal to 2; see [4]) according to the following requirements:

- If service option negotiation is completed as a result of the base station sending a *Service Option Response Order*, then the mobile station shall declare the service option to be active at the explicit or implicit action time associated with the *Service Option Response Order*.
- If service option negotiation is completed as a result of the mobile station sending a *Service Option Response Order*, then the mobile station shall declare the service option to be active when the later of the following two times occurs:
 - The implicit or explicit action time associated with the most recently received *Service Option Request Order* from the base station, or
 - The time at which the mobile station sends the *Service Option Response Order* that accepts Service Option 2.

2.3.3.1.1 Initialization and Connection in the Mobile Station

No initialization is required for Service Option 2.

1 The mobile station shall connect Service Option 2 as follows:

- 2 • If Service Option 2 is active when the mobile station enters the *Waiting for Mobile*
3 *Station Answer Substate* or Service Option 2 becomes active when the mobile station
4 is already in the *Waiting for Mobile Station Answer Substate*, then the mobile station
5 shall initiate an auto-answer.¹
- 6 • If Service Option 2 becomes active when the mobile station is not in the *Conversation*
7 *Substate*, then the mobile station shall connect Service Option 2 immediately upon
8 entering the *Conversation Substate*. Otherwise, the mobile station shall connect
9 Service Option 2 at the time it becomes active. The mobile station shall complete
10 connection of Service Option 2 within 200 ms of starting the connection.

11 When Service Option 2 is connected, Service Option 2 shall begin processing data blocks it
12 obtains from the receiving side of the multiplex sublayer as specified in 2.5. Refer to [4] for
13 procedures to be followed when Service Option 2 is not connected.

14 2.3.3.1.2 Initialization and Connection in the Base Station

15 The base station should wait until the action time associated with the most recently
16 transmitted *Service Option Response Order* or *Service Option Request Order* before
17 initializing and connecting Service Option 2.

18 When Service Option 2 is connected, Service Option 2 shall generate and provide test data
19 blocks to the transmitting side of the multiplex sublayer as specified in 2.4.1. Refer to [4]
20 for procedures to be followed when Service Option 2 is not connected.

21 2.3.3.1.3 Service Option Control Orders

22 The base station shall not send any *Service Option Control Orders* relating to Service Option
23 2 to the mobile station. The mobile station shall not send any *Service Option Control Orders*
24 relating to Service Option 2 to the base station.

25 2.3.3.2 Procedures Using Service Negotiation

26 2.3.3.2.1 Mobile Station Requirements

27 The mobile station shall perform service negotiation for Service Option 2, 9, 30, 31, ,55, or
28 75 as described in [4]. The mobile station shall only propose service configurations for
29 Service Option 2, 9, 30, 31, 55, or 75 with attributes as specified in Table 2.3.3.2.1-1,
30 Table 2.3.3.2.1-2, Table 2.3.3.2.1-3, Table 2.3.3.2.1-4, Table 2.3.3.2.1-5, and Table
31 2.3.3.2.1-6 respectively. The mobile station shall reject any service configuration for Service
32 Option 2, 9, 30, 31, 55, or 75 with attributes different from those specified in Table

¹ For purposes of this standard, the term “auto-answer” shall have the following supplementary meaning: While in the *Waiting for Mobile Station Answer Substate* of the *Mobile Station Control on the Traffic Channel State*, the mobile station shall automatically send a *Connect Order* to the base station as a message requiring acknowledgment without waiting for the user to explicitly command the call to be answered. The mobile station shall enter the *Conversation Substate*.

1 2.3.3.2.1-1, Table 2.3.3.2.1-2, Table 2.3.3.2.1-3, Table 2.3.3.2.1-4, Table 2.3.3.2.1-5, and
2 Table 2.3.3.2.1-6, respectively.

3 When using Service Option 55, for a mobile station operating in MC-41 mode, the mobile
4 station shall indicate the preferred Forward RC and Reverse RC in the FOR_RC_PREF field
5 and the REV_RC_PREF field, respectively, in the *Page Response Message* and *Origination*
6 *Message*. For a mobile station operating in MC-MAP mode (see [5]), the mobile station shall
7 indicate the preferred Forward RC and Reverse RC in the FOR_RC_PREF field and the
8 REV_RC_PREF field, respectively, in the *MC-MAP RRC Connection Request Message*.

9 **Table 2.3.3.2.1-1. Valid Service Configuration Attributes for Service Option 2**

Service Configuration Attribute	Valid Selections
Forward Multiplex Option	Multiplex Option 0x01
Reverse Multiplex Option	Multiplex Option 0x01
Forward Transmission Rates	Rate Set 1 with all 4 rates enabled
Reverse Transmission Rates	Rate Set 1 with all 4 rates enabled
Forward Traffic Type	Primary Traffic on Forward Fundamental Code Channel
Reverse Traffic Type	Primary Traffic on Reverse Fundamental Code Channel

10 **Table 2.3.3.2.1-2. Valid Service Configuration Attributes for Service Option 9**

Service Configuration Attribute	Valid Selections
Forward Multiplex Option	Multiplex Option 0x02
Reverse Multiplex Option	Multiplex Option 0x02
Forward Transmission Rates	Rate Set 2 with all 4 rates enabled
Reverse Transmission Rates	Rate Set 2 with all 4 rates enabled
Forward Traffic Type	Primary Traffic on Forward Fundamental Code Channel
Reverse Traffic Type	Primary Traffic on Reverse Fundamental Code Channel

11

1 **Table 2.3.3.2.1-3. Valid Service Configuration Attributes for Service Option 30**

Service Configuration Attribute	Valid Selections
Forward Multiplex Option	Multiplex Option 0x03
Reverse Multiplex Option	Multiplex Option 0x01
Forward Transmission Rates	Rate Set 1
Reverse Transmission Rates	Rate Set 1
Forward Traffic Type	Primary Traffic on Forward Supplemental Code Channel
Reverse Traffic Type	Primary Traffic on Reverse Fundamental Code Channel

2 **Table 2.3.3.2.1-4. Valid Service Configuration Attributes for Service Option 31**

Service Configuration Attribute	Valid Selections
Forward Multiplex Option	Multiplex Option 0x04
Reverse Multiplex Option	Multiplex Option 0x02
Forward Transmission Rates	Rate Set 2
Reverse Transmission Rates	Rate Set 2
Forward Traffic Type	Primary Traffic on Forward Supplemental Code Channel
Reverse Traffic Type	Primary Traffic on Reverse Fundamental Code Channel

3

Table 2.3.3.2.1-5. Valid Service Configuration Attributes for Service Option 55

Service Configuration Attribute	Valid Selections
Forward Multiplex Option	Multiplex Option 0x01 or 0x02
Reverse Multiplex Option	Same as Forward Multiplex Option
Forward Fundamental Channel RC	1, 3, 4, 6, or 7 with Multiplex Option 0x01 2, 5, 8, or 9 with Multiplex Option 0x02
Reverse Fundamental Channel RC	1, 3, or 5 with Multiplex Option 0x01 2, 4, or 6 with Multiplex Option 0x02
Forward Traffic Type	Primary Traffic on Forward Fundamental Channel
Reverse Traffic Type	Primary Traffic on Reverse Fundamental Channel

Table 2.3.3.2.1-6. Valid Service Configuration Attributes for Service Option 75

Service Configuration Attribute	Valid Selections
Forward Multiplex Option	Multiplex Option 0x01
Reverse Multiplex Option	Same as Forward Multiplex Option
Forward Fundamental Channel RC	11, 12
Reverse Fundamental Channel RC	8
Forward Traffic Type	Primary Traffic on Forward Fundamental Channel
Reverse Traffic Type	Primary Traffic on Reverse Fundamental Channel

If the mobile station accepts a service configuration, as specified in a *Service Connect Message*, that includes a service option connection using Service Option 2, 9, 30, 31, 55, or 75 then, commencing at the action time associated with the *Service Connect Message* and continuing for as long as the service configuration includes the service option connection, Service Option 2, 9, 30, 31, 55, or 75 shall process received test data blocks and generate and shall supply test data blocks for transmission in accordance with this standard.

If a service option connection associated with Service Option 2, 9, 30, 31, 55, or 75 is part of the current service configuration when the mobile station enters the *Waiting for Mobile Station Answer Substate*, or if a service option connection associated with Service Option 2, 9, 30, 31, 55, or 75 becomes part of the current service configuration while the mobile station is in the *Waiting for Mobile Station Answer Substate*, the mobile station shall initiate an auto-answer as described in 2.3.3.1.1.

The mobile station shall not send a *Service Option Control Message* for Service Option 2, 9, 30, 31, 55, or 75.

1 2.3.3.2.2 Base Station Requirements

2 The base station shall perform service negotiation for Service Option 2, 9, 30, 31, 55, or 75
3 as described in [4]. The base station shall only propose service configurations for Service
4 Option 2, 9, 30, 31, 55, or 75 with attributes as specified in Table 2.3.3.2.1-1, Table
5 2.3.3.2.1-2, Table 2.3.3.2.1-3, Table 2.3.3.2.1-4, Table 2.3.3.2.1-5, and Table 2.3.3.2.1-6,
6 respectively. The base station shall reject any service configuration for Service Option 2, 9,
7 30, 31, 55 or 75 with attributes different from those specified in Table 2.3.3.2.1-1, Table
8 2.3.3.2.1-2, Table 2.3.3.2.1-3, Table 2.3.3.2.1-4, Table 2.3.3.2.1-5, and Table 2.3.3.2.1-6,
9 respectively.

10 If the base station establishes a service configuration, as specified in a *Service Connect*
11 *Message*, that includes a service option connection using Service Option 2, 9, 30, 31, 55, or
12 75 then, commencing at the action time associated with the *Service Connect Message* and
13 continuing for as long as the service configuration includes the service option connection,
14 Service Option 2, 9, 30, 31, 55, or 75 shall generate and shall supply test data blocks for
15 transmission in accordance with this standard.

16 The base station shall not send a *Service Option Control Message* for Service Option 2, 9,
17 30, 31, 55, or 75.

18 2.4 Data Block Information Bits

19 2.4.1 Service Option 2

20 Figure 2.4.1-1 shows four of the five data block formats that are used by Service Option 2.
21 The Blank data block is not shown.

22 The base station shall supply the number of information bits shown in Table 2.3.2.1.1-1.²
23 The base station may use any bit pattern for both the data bits and the CAT_TYPE field.

24 The mobile station shall supply the number of information bits shown in Table 2.3.2.1.1-1.
25 The mobile station shall supply the data bits and CAT_TYPE field as described in 2.5.

²The term information bits is used when referring to all the bits in the data block; the term data bits is used when referring to the subset looped back by the mobile station. The CAT_TYPE field concatenated with the data bits are the information bits.

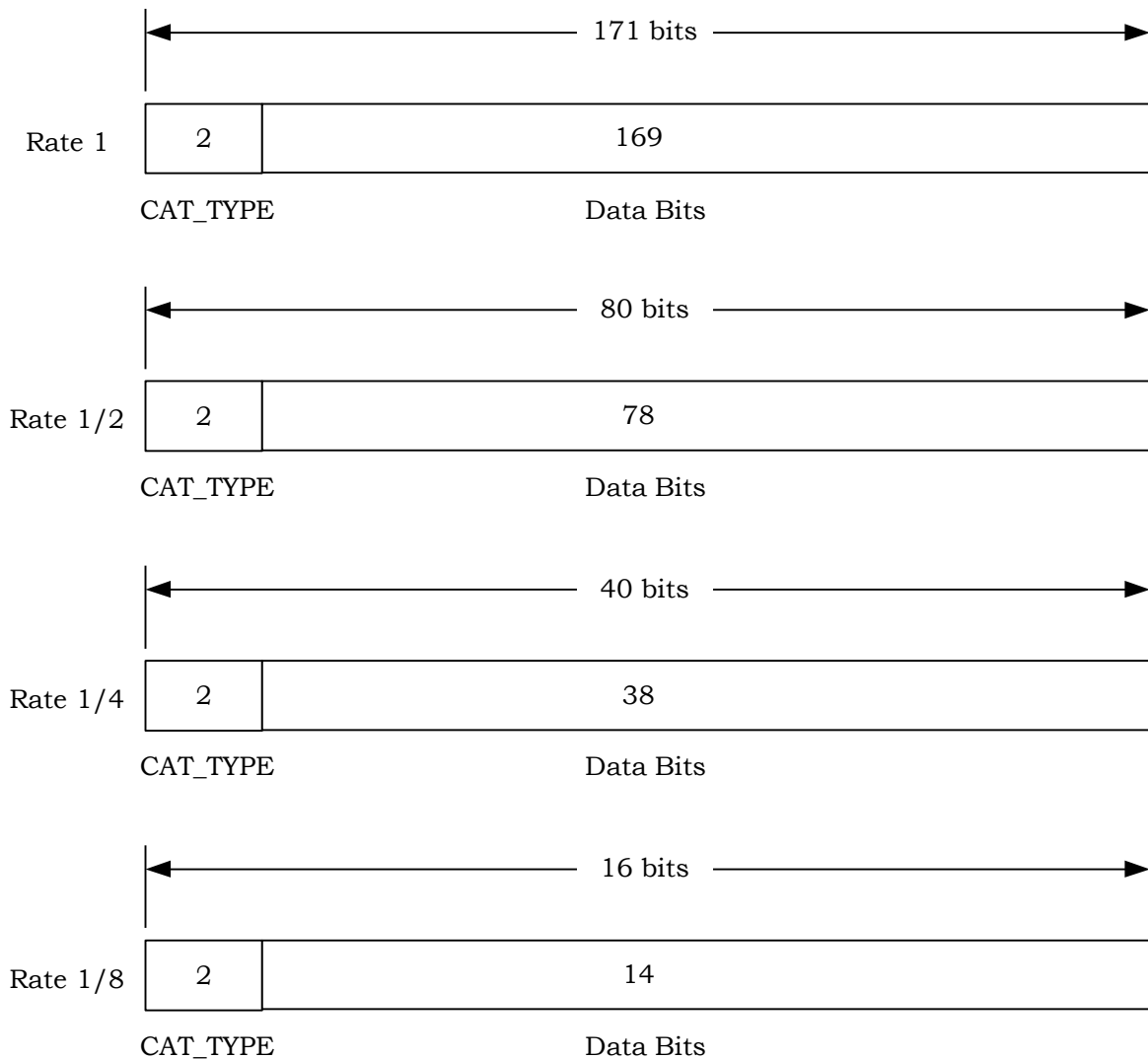


Figure 2.4.1-1. Data Block Formats for Service Option 2

1

2 2.4.2 Service Option 9

3 Figure 2.4.2-1 shows four of the five data block formats that are used by Service Option 9.
 4 The Blank data block is not shown.

5 The base station shall supply the number of information bits shown in Table 2.3.2.2.1-1.
 6 The base station may use any bit pattern for both the data bits and the CAT_TYPE field.

7 The mobile station shall supply the number of information bits shown in Table 2.3.2.2.1-1.
 8 The mobile station shall supply the data bits and CAT_TYPE field as described in 2.5.

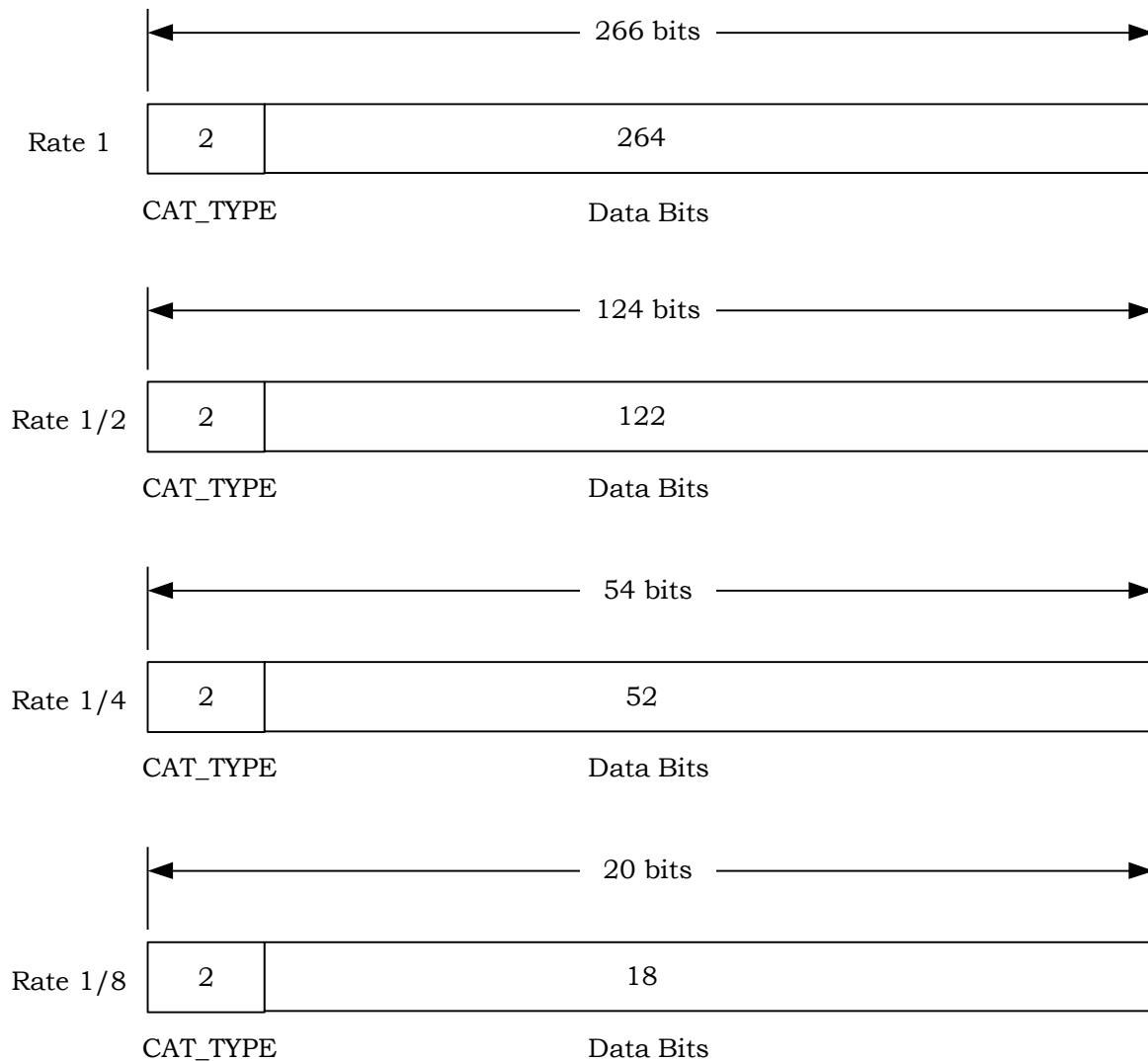


Figure 2.4.2-1. Data Block Formats for Service Option 9

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2.4.3 Service Option 30

Figure 2.4.3-1 shows one of the data block formats that is used by Service Option 30. The Blank data block is not shown.

The base station shall supply the number of information bits shown in Table 2.3.2.3.1-1.

The base station may use any bit pattern for both the data bits and the CAT_TYPE field.

The mobile station shall supply the number of information bits shown in Table 2.3.2.3.1-1.

The mobile station shall supply the data bits and CAT_TYPE field as described in 2.5.

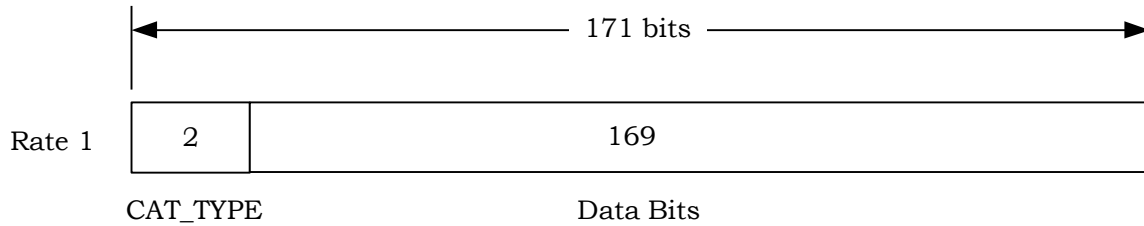


Figure 2.4.3-1. Data Block Format for Service Option 30

2.4.4 Service Option 31

Figure 2.4.4-1 shows one of the data block formats that is used by Service Option 31. The Blank data block is not shown.

The base station shall supply the number of information bits shown in Table 2.3.2.4.1-1. The base station may use any bit pattern for both the data bits and the CAT_TYPE field.

The mobile station shall supply the number of information bits shown in Table 2.3.2.4.1-1. The mobile station shall supply the data bits and CAT_TYPE field as described in 2.5.

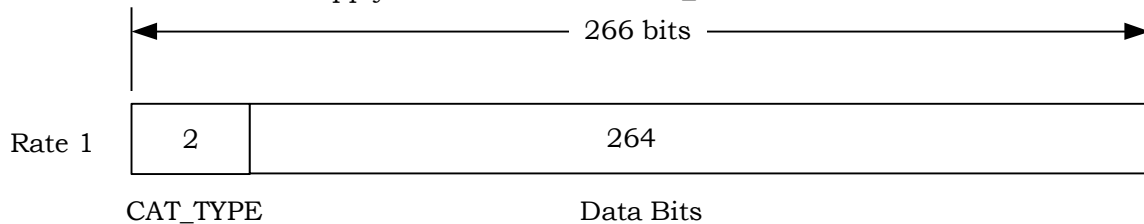


Figure 2.4.4-1. Data Block Format for Service Option 31

2.4.5 Service Option 55

If Multiplex Option 0x01 is used, the mobile station shall follow the procedures described in 2.4.1 for Service Option 2 as if Service Option 2 were used.

If Multiplex Option 0x02 is used, the mobile station shall follow the procedures described in 2.4.2 for Service Option 9 as if Service Option 9 were used.

2.4.6 Service Option 75

Figure 2.4.6-1 shows four of the five data block formats that are used by Service Option 75. The Rate 1/8 Non-critical data block format is the same Rate 1/8 data block format. The Blank data block is not shown.

The base station shall supply the number of information bits shown in Table 2.3.2.6.1-1.³ The base station may use any bit pattern for both the data bits and the CAT_TYPE field.

The mobile station shall supply the number of information bits shown in Table 2.3.2.6.1-1. The mobile station shall supply the data bits and CAT_TYPE field as described in 2.5.

³The term information bits is used when referring to all the bits in the data block; the term data bits is used when referring to the subset looped back by the mobile station. The CAT_TYPE field concatenated with the data bits are the information bits.

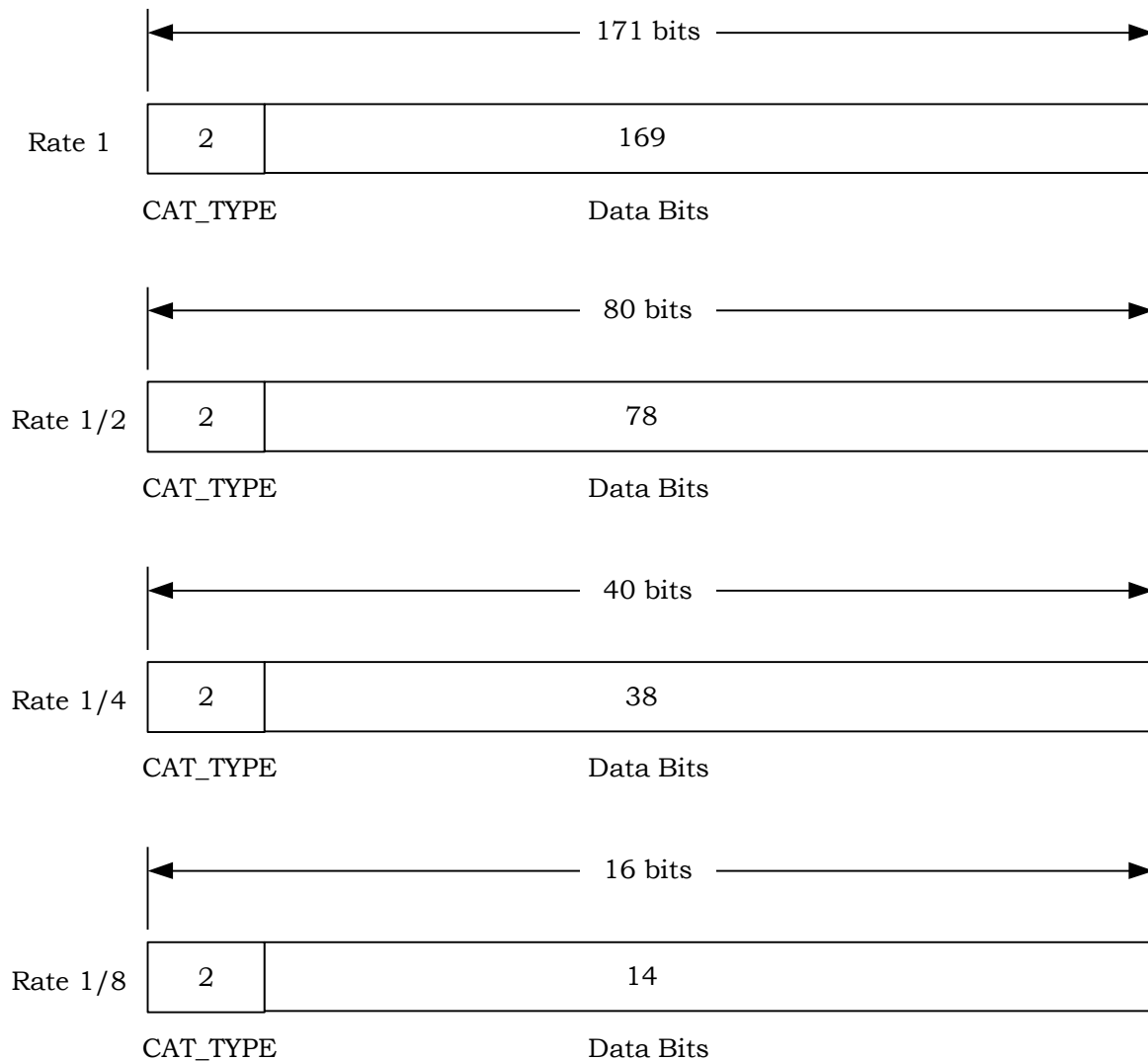


Figure 2.4.6-1. Data Block Formats for Service Option 75

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2.5 Mobile Station Processing

2.5.1 Basic Data Block Processing

Table 2.5.1-1 specifies the data block processing for Service Options 2 and 9. If the mobile station supports Service Option 2, then the mobile station shall provide the processing described in 2.5.1.1. If the mobile station supports Service Option 9, then the mobile station shall provide the processing described in 2.5.1.2.

Table 2.5.1-2 specifies the data block processing for Service Options 30 and 31. If the mobile station supports Service Option 30, then the mobile station shall provide the processing described in 2.5.1.3. If the mobile station supports Service Option 31, then the mobile station shall provide the processing described in 2.5.1.4.

1 Table 2.5.1-3 specifies the data block processing for Service Option 75. If the mobile station
 2 supports Service Option 75, then the mobile station shall provide the processing described
 3 in 2.5.1.6.

4 **Table 2.5.1-1. Service Option 2 or 9 Data Block Processing**

Data Block Type Received from the Multiplex Sublayer	Rate Restriction	Data Block Type Supplied to the Multiplex Sublayer	CAT_TYPE Field (binary)
Rate 1	None	Rate 1	00
Rate 1	Not Rate 1	Rate 1/2	11
Rate 1	Blank	Blank	Field not Present
Rate 1/2	None	Rate 1/2	00
Rate 1/2	Not Rate 1	Rate 1/2	00
Rate 1/2	Blank	Blank	Field not Present
Rate 1/4	None	Rate 1/4	00
Rate 1/4	Not Rate 1	Rate 1/4	00
Rate 1/4	Blank	Blank	Field not Present
Rate 1/8	None	Rate 1/8	00
Rate 1/8	Not Rate 1	Rate 1/8	00
Rate 1/8	Blank	Blank	Field not Present
Blank	None	Rate 1	01
Blank	Not Rate 1	Rate 1/2	01
Blank	Blank	Blank	Field not Present
Rate 1 with Bit Errors (Service Option 2 only)	None	Rate 1	10
Rate 1 with Bit Errors (Service Option 2 only)	Not Rate 1	Rate 1/2	10
Rate 1 with Bit Errors (Service Option 2 only)	Blank	Blank	Field not Present
Insufficient Frame Quality (Erasure)	None	Rate 1	11
Insufficient Frame Quality (Erasure)	Not Rate 1	Rate 1/8	11
Insufficient Frame Quality (Erasure)	Blank	Blank	Field not Present

5

6

1 **Table 2.5.1-2. Service Option 30 or 31 Data Block Processing**

Data Block Type Received from the Multiplex Sublayer	Rate Restriction	Data Block Type Supplied to the Multiplex Sublayer	CAT_TYPE Field (binary)
Rate 1	None	Rate 1	00
Rate 1	Not Rate 1	Rate 1/2	11
Rate 1	Blank	Blank	Field not Present
Insufficient Frame Quality (Erasure)	None	Rate 1	11
Insufficient Frame Quality (Erasure)	Not Rate 1	Rate 1/8	11
Insufficient Frame Quality (Erasure)	Blank	Blank	Field not Present

2
3 **Table 2.5.1-3. Service Option 75 Data Block Processing**

Data Block Type Received from the Multiplex Sublayer	Rate Restriction	Data Block Type Supplied to the Multiplex Sublayer	CAT_TYPE Field (binary)
Rate 1	None	Rate 1	00
Rate 1	Not Rate 1	Rate 1/2	11
Rate 1	Blank	Blank	Field not Present
Rate 1/2	None	Rate 1/2	00
Rate 1/2	Not Rate 1	Rate 1/2	00
Rate 1/2	Blank	Blank	Field not Present
Rate 1/4	None	Rate 1/4	00
Rate 1/4	Not Rate 1	Rate 1/4	00
Rate 1/4	Blank	Blank	Field not Present
Rate 1/8	None	Rate 1/8	00
Rate 1/8	Not Rate 1	Rate 1/8	00
Rate 1/8	Blank	Blank	Field not Present
Blank	None	Rate 1	01
Blank	Not Rate 1	Rate 1/2	01
Blank	Blank	Blank	Field not Present
Rate 1 with Bit Errors	None	Rate 1	10
Rate 1 with Bit Errors	Not Rate 1	Rate 1/2	10

Data Block Type Received from the Multiplex Sublayer	Rate Restriction	Data Block Type Supplied to the Multiplex Sublayer	CAT_TYPE Field (binary)
Rate 1 with Bit Errors	Blank	Blank	Field not Present
Insufficient Frame Quality (Erasure)	None	Rate 1	11
Insufficient Frame Quality (Erasure)	Not Rate 1	Rate 1/8	11
Insufficient Frame Quality (Erasure)	Blank	Blank	Field not Present

1

2 2.5.1.1 Service Option 2

3 If the processing delay (see 2.5.2) in looping back the Forward Fundamental Code Channel
4 frame is x frames, then for the first x frames immediately following the connection of the
5 service option, Service Option 2 should supply to the multiplex sublayer data blocks of
6 Rate 1/8 in which all primary reverse fundamental data block traffic data bits are set to '1'.
7 Afterwards, the mobile station shall perform the following processing as specified in Table
8 2.5.1-1:

- 9 • If Service Option 2 has been commanded to generate a non-blank data block with a
10 maximum rate of Rate 1/2, then:
- 11 - If the received data block is Rate 1, then Service Option 2 shall set the
12 CAT_TYPE field equal to '11' and shall set 78 data bits to the least significant 78
13 of the 169 received data bits. The resulting 80 information bits shall be supplied
14 to the multiplex sublayer as a Rate 1/2 data block.
 - 15 - If the received data block is Rate 1/2, then Service Option 2 shall set the
16 CAT_TYPE field equal to '00' and the 78 data bits to the 78 received data bits.
17 The resulting 80 information bits shall be supplied to the multiplex sublayer as
18 a Rate 1/2 data block.
 - 19 - If the received data block is Rate 1/4, then Service Option 2 shall set the
20 CAT_TYPE field equal to '00' and the 38 data bits to the 38 received data bits.
21 The resulting 40 information bits shall be supplied to the multiplex sublayer as
22 a Rate 1/4 data block.
 - 23 - If the received data block is Rate 1/8, then Service Option 2 shall set the
24 CAT_TYPE field equal to '00' and the 14 data bits to the 14 received data bits.
25 The resulting 16 information bits shall be supplied to the multiplex sublayer as
26 a Rate 1/8 data block.
 - 27 - If the received data block is Blank, then Service Option 2 shall set the
28 CAT_TYPE field equal to '01' and shall set 78 data bits to any desired value. The

- 1 resulting 80 information bits shall be supplied to the multiplex sublayer as a
2 Rate 1/2 data block.
- 3 - If the received data block is Rate 1 with Bit Errors, then Service Option 2 shall
4 set the CAT_TYPE field equal to '10' and shall set 78 data bits to the least
5 significant 78 of the 169 received data bits. The resulting 80 information bits
6 shall be supplied to the multiplex sublayer as a Rate 1/2 data block.
 - 7 - If the received data block is Insufficient Frame Quality (Erasure), then Service
8 Option 2 shall set the CAT_TYPE field equal to '11' and shall set 14 data bits to
9 any desired value. The resulting 16 information bits shall be supplied to the
10 multiplex sublayer as a Rate 1/8 data block.
- 11 • If Service Option 2 has been commanded to generate a Blank data block, Service
12 Option 2 shall do so, thus providing zero information bits to the multiplex sublayer.
 - 13 • If Service Option 2 has not been commanded to adapt its rates, then:
 - 14 - If the received data block is Rate 1, then Service Option 2 shall set the
15 CAT_TYPE field equal to '00' and the 169 data bits to the 169 received data bits.
16 The resulting 171 information bits shall be supplied to the multiplex sublayer as
17 a Rate 1 data block.
 - 18 - If the received data block is Rate 1/2, then Service Option 2 shall set the
19 CAT_TYPE field equal to '00' and the 78 data bits to the 78 received data bits.
20 The resulting 80 information bits shall be supplied to the multiplex sublayer as
21 a Rate 1/2 data block.
 - 22 - If the received data block is Rate 1/4, then Service Option 2 shall set the
23 CAT_TYPE field equal to '00' and the 38 data bits to the 38 received data bits.
24 The resulting 40 information bits shall be supplied to the multiplex sublayer as
25 a Rate 1/4 data block.
 - 26 - If the received data block is Rate 1/8, then Service Option 2 shall set the
27 CAT_TYPE field equal to '00' and the 14 data bits to the 14 received data bits.
28 The resulting 16 information bits shall be supplied to the multiplex sublayer as
29 a Rate 1/8 data block.
 - 30 - If the received data block is Blank, then Service Option 2 shall set the
31 CAT_TYPE field equal to '01' and shall set 169 data bits to any desired value.
32 The resulting 171 information bits shall be supplied to the multiplex sublayer as
33 a Rate 1 data block.
 - 34 - If the received data block is Rate 1 with Bit Errors, then Service Option 2 shall
35 set the CAT_TYPE field equal to '10' and the 169 data bits to the 169 received
36 data bits. The resulting 171 information bits shall be supplied to the multiplex
37 sublayer as a Rate 1 data block.
 - 38 - If the received data block is Insufficient Frame Quality (Erasure), then Service
39 Option 2 shall set the CAT_TYPE field equal to '11' and shall set 169 data bits to
40 any desired value. The resulting 171 information bits shall be supplied to the
41 multiplex sublayer as a Rate 1 data block.

2.5.1.2 Service Option 9

If the processing delay (see 2.5.2) in looping back the Forward Fundamental Code Channel frame is x frames, then for the first x frames immediately following the connection of the service option, Service Option 9 should supply to the multiplex sublayer data blocks of Rate 1/8 in which all primary reverse fundamental data block traffic data bits are set to '1'. Afterwards, the mobile station shall perform the following processing as specified in Table 2.5.1-1:

- If Service Option 9 has been commanded to generate a non-blank data block with a maximum rate of Rate 1/2, then:
 - If the received data block is Rate 1, then Service Option 9 shall set the CAT_TYPE field equal to '11' and shall set 122 data bits to the least significant 122 of the 264 received data bits. The resulting 124 information bits shall be supplied to the multiplex sublayer as a Rate 1/2 data block.
 - If the received data block is Rate 1/2, then Service Option 9 shall set the CAT_TYPE field equal to '00' and the 122 data bits to the 122 received data bits. The resulting 124 information bits shall be supplied to the multiplex sublayer as a Rate 1/2 data block.
 - If the received data block is Rate 1/4, then Service Option 9 shall set the CAT_TYPE field equal to '00' and the 52 data bits to the 52 received data bits. The resulting 54 information bits shall be supplied to the multiplex sublayer as a Rate 1/4 data block.
 - If the received data block is Rate 1/8, then Service Option 9 shall set the CAT_TYPE field equal to '00' and the 18 data bits to the 18 received data bits. The resulting 20 information bits shall be supplied to the multiplex sublayer as a Rate 1/8 data block.
 - If the received data block is Blank, then Service Option 9 shall set the CAT_TYPE field equal to '01' and shall set 122 data bits to any desired value. The resulting 124 information bits shall be supplied to the multiplex sublayer as a Rate 1/2 data block.
 - If the received data block is Insufficient Frame Quality (Erasure), then Service Option 9 shall set the CAT_TYPE field equal to '11' and shall set 18 data bits to any desired value. The resulting 20 information bits shall be supplied to the multiplex sublayer as a Rate 1/8 data block.
- If Service Option 9 has been commanded to generate a Blank data block, Service Option 9 shall do so, thus providing zero information bits to the multiplex sublayer.
- If Service Option 9 has not been commanded to adapt its rates, then:
 - If the received data block is Rate 1, then Service Option 9 shall set the CAT_TYPE field equal to '00' and the 264 data bits to the 264 received data bits. The resulting 266 information bits shall be supplied to the multiplex sublayer as a Rate 1 data block.

- 1 - If the received data block is Rate 1/2, then Service Option 9 shall set the
2 CAT_TYPE field equal to '00' and the 122 data bits to the 122 received data bits.
3 The resulting 124 information bits shall be supplied to the multiplex sublayer as
4 a Rate 1/2 data block.
- 5 - If the received data block is Rate 1/4, then Service Option 9 shall set the
6 CAT_TYPE field equal to '00' and the 52 data bits to the 52 received data bits.
7 The resulting 54 information bits shall be supplied to the multiplex sublayer as
8 a Rate 1/4 data block.
- 9 - If the received data block is Rate 1/8, then Service Option 9 shall set the
10 CAT_TYPE field equal to '00' and the 18 data bits to the 18 received data bits.
11 The resulting 20 information bits shall be supplied to the multiplex sublayer as
12 a Rate 1/8 data block.
- 13 - If the received data block is Blank, then Service Option 9 shall set the
14 CAT_TYPE field equal to '01' and shall set 264 data bits to any desired value.
15 The resulting 266 information bits shall be supplied to the multiplex sublayer as
16 a Rate 1 data block.
- 17 - If the received data block is Insufficient Frame Quality (Erasure), then Service
18 Option 9 shall set the CAT_TYPE field equal to '11' and shall set 264 data bits to
19 any desired value. The resulting 266 information bits shall be supplied to the
20 multiplex sublayer as a Rate 1 data block.

21 2.5.1.3 Service Option 30

22 If the processing delay (see 2.5.2) in looping back the Forward Supplemental Code Channel
23 frame is x frames, then for the first x frames immediately following the connection of the
24 service option, Service Option 30 should supply to the multiplex sublayer data blocks of
25 Rate 1/8 in which all primary reverse fundamental data block traffic data bits are set to '1'.
26 Afterwards, the mobile station shall perform the following processing as specified in Table
27 2.5.1-2:

- 28 • If Service Option 30 has been commanded to generate a non-blank data block with a
29 maximum rate of Rate 1/2, then:
- 30 - If the received data block is Rate 1, then Service Option 30 shall set the
31 CAT_TYPE field equal to '11' and shall set 78 data bits to the least significant 78
32 of the 169 received data bits. The resulting 80 information bits shall be supplied
33 to the multiplex sublayer as a Rate 1/2 data block.
- 34 - If the received data block is Insufficient Frame Quality (Erasure), then Service
35 Option 30 shall set the CAT_TYPE field equal to '11' and shall set 14 data bits to
36 any desired value. The resulting 16 information bits shall be supplied to the
37 multiplex sublayer as a Rate 1/8 data block.
- 38 • If Service Option 30 has been commanded to generate a Blank data block, Service
39 Option 30 shall do so, thus providing zero information bits to the multiplex sublayer.
- 40 • If Service Option 30 has not been commanded to adapt its rates, then:

- 1 - If the received data block is Rate 1, then Service Option 30 shall set the
2 CAT_TYPE field equal to '00' and the 169 data bits to the 169 received data bits.
3 The resulting 171 information bits shall be supplied to the multiplex sublayer as
4 a Rate 1 data block.
- 5 - If the received data block is Insufficient Frame Quality (Erasure), then Service
6 Option 30 shall set the CAT_TYPE field equal to '11' and shall set 169 data bits
7 to any desired value. The resulting 171 information bits shall be supplied to the
8 multiplex sublayer as a Rate 1 data block.

9 2.5.1.4 Service Option 31

10 If the processing delay (see 2.5.2) in looping back the Forward Supplemental Code Channel
11 frame is x frames, then for the first x frames immediately following the connection of the
12 service option, Service Option 31 should supply to the multiplex sublayer data blocks of
13 Rate 1/8 in which all primary reverse fundamental data block traffic data bits are set to '1'.
14 Afterwards, the mobile station shall perform the following processing as specified in Table
15 2.5.1-2:

- 16 • If Service Option 31 has been commanded to generate a non-blank data block with a
17 maximum rate of Rate 1/2, then:
 - 18 - If the received data block is Rate 1, then Service Option 31 shall set the
19 CAT_TYPE field equal to '11' and shall set 122 data bits to the least significant
20 122 of the 264 received data bits. The resulting 124 information bits shall be
21 supplied to the multiplex sublayer as a Rate 1/2 data block.
 - 22 - If the received data block is Insufficient Frame Quality (Erasure), then Service
23 Option 31 shall set the CAT_TYPE field equal to '11' and shall set 18 data bits to
24 any desired value. The resulting 20 information bits shall be supplied to the
25 multiplex sublayer as a Rate 1/8 data block.
- 26 • If Service Option 31 has been commanded to generate a Blank data block, Service
27 Option 31 shall do so, thus providing zero information bits to the multiplex sublayer.
- 28 • If Service Option 31 has not been commanded to adapt its rates, then:
 - 29 - If the received data block is Rate 1, then Service Option 31 shall set the
30 CAT_TYPE field equal to '00' and the 264 data bits to the 264 received data bits.
31 The resulting 266 information bits shall be supplied to the multiplex sublayer as
32 a Rate 1 data block.
 - 33 - If the received data block is Insufficient Frame Quality (Erasure), then Service
34 Option 31 shall set the CAT_TYPE field equal to '11' and shall set 264 data bits
35 to any desired value. The resulting 266 information bits shall be supplied to the
36 multiplex sublayer as a Rate 1 data block.

37 2.5.1.5 Service Option 55

38 If Multiplex Option 0x01 is use, then the mobile station shall follow the processing
39 described in 2.5.1.1 for Service Option 2 as if Service Option 2 were used.

1 If Multiplex Option 0x02 is use, then the mobile station shall follow the processing
2 described in 2.5.1.2 for Service Option 9 as if Service Option 9 were used.

3 2.5.1.6 Service Option 75

4 If the processing delay (see 2.5.2) in looping back the Forward Fundamental Channel frame
5 is x frames, then for the first x frames immediately following the connection of the service
6 option, Service Option 75 should supply to the multiplex sublayer data blocks of Rate 1/8
7 in which all primary reverse fundamental data block traffic data bits are set to '1'.
8 Afterwards, the mobile station shall perform the following processing as specified in Table
9 2.5.1-3. Service Option 75 Data Block Processing:

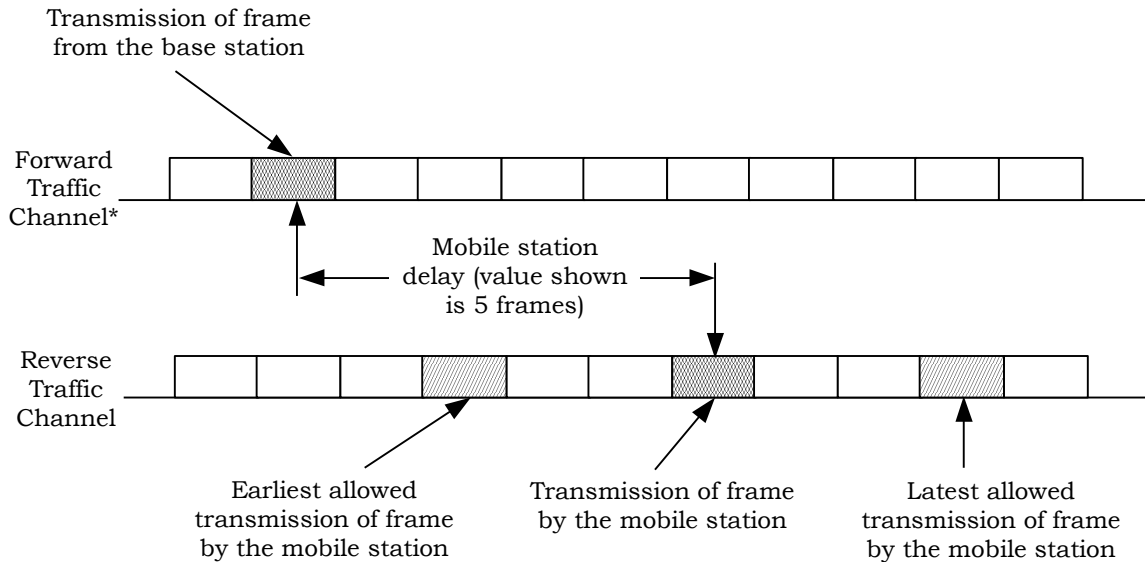
- 10 • If Service Option 75 has been commanded to generate a non-blank data block with a
11 maximum rate of Rate 1/2, then:
 - 12 - If the received data block is Rate 1, then Service Option 75 shall set the
13 CAT_TYPE field equal to '11' and shall set 78 data bits to the least significant 78
14 of the 169 received data bits. The resulting 80 information bits shall be supplied
15 to the multiplex sublayer as a Rate 1/2 data block.
 - 16 - If the received data block is Rate 1/2, then Service Option 75 shall set the
17 CAT_TYPE field equal to '00' and the 78 data bits to the 78 received data bits.
18 The resulting 80 information bits shall be supplied to the multiplex sublayer as
19 a Rate 1/2 data block.
 - 20 - If the received data block is Rate 1/4, then Service Option 75 shall set the
21 CAT_TYPE field equal to '00' and the 38 data bits to the 38 received data bits.
22 The resulting 40 information bits shall be supplied to the multiplex sublayer as
23 a Rate 1/4 data block.
 - 24 - If the received data block is Rate 1/8, then Service Option 75 shall set the
25 CAT_TYPE field equal to '00' and the 14 data bits to the 14 received data bits.
26 The resulting 16 information bits shall be supplied to the multiplex sublayer as
27 a Rate 1/8 data block.
 - 28 - If the received data block is Blank resulted from a blank-and-burst
29 Fundamental Channel frame, then Service Option 75 shall set the CAT_TYPE
30 field equal to '01' and shall set 78 data bits to any desired value. The resulting
31 80 information bits shall be supplied to the multiplex sublayer as a Rate 1/2
32 data block.
 - 33 - If the received data block is Rate 1 with Bit Errors, then Service Option 75 shall
34 set the CAT_TYPE field equal to '10' and shall set 78 data bits to the least
35 significant 78 of the 169 received data bits. The resulting 80 information bits
36 shall be supplied to the multiplex sublayer as a Rate 1/2 data block.
 - 37 - If the received data block is Insufficient Frame Quality (Erasure), then Service
38 Option 75 shall set the CAT_TYPE field equal to '11' and shall set 14 data bits to
39 any desired value. The resulting 16 information bits shall be supplied to the
40 multiplex sublayer as a Rate 1/8 data block.

- 1 • If Service Option 75 has been commanded to generate a Blank data block, Service
2 Option 75 shall do so, thus providing zero information bits to the multiplex sublayer.
- 3 • If Service Option 75 has not been commanded to adapt its rates, then:
 - 4 - If the received data block is Rate 1, then Service Option 75 shall set the
5 CAT_TYPE field equal to '00' and the 169 data bits to the 169 received data bits.
6 The resulting 171 information bits shall be supplied to the multiplex sublayer as
7 a Rate 1 data block.
 - 8 - If the received data block is Rate 1/2, then Service Option 75 shall set the
9 CAT_TYPE field equal to '00' and the 78 data bits to the 78 received data bits.
10 The resulting 80 information bits shall be supplied to the multiplex sublayer as
11 a Rate 1/2 data block.
 - 12 - If the received data block is Rate 1/4, then Service Option 75 shall set the
13 CAT_TYPE field equal to '00' and the 38 data bits to the 38 received data bits.
14 The resulting 40 information bits shall be supplied to the multiplex sublayer as
15 a Rate 1/4 data block.
 - 16 - If the received data block is Rate 1/8, then Service Option 75 shall set the
17 CAT_TYPE field equal to '00' and the 14 data bits to the 14 received data bits.
18 The resulting 16 information bits shall be supplied to the multiplex sublayer as
19 a Rate 1/8 data block.
 - 20 - If the received data block is Blank resulted from a blank-and-burst
21 Fundamental Channel frame, then Service Option 75 shall set the CAT_TYPE
22 field equal to '01' and shall set 169 data bits to any desired value. The resulting
23 171 information bits shall be supplied to the multiplex sublayer as a Rate 1
24 data block.
 - 25 - If the received data block is Rate 1 with Bit Errors, then Service Option 75 shall
26 set the CAT_TYPE field equal to '10' and the 169 data bits to the 169 received
27 data bits. The resulting 171 information bits shall be supplied to the multiplex
28 sublayer as a Rate 1 data block.
 - 29 - If the received data block is Insufficient Frame Quality (Erasure), then Service
30 Option 75 shall set the CAT_TYPE field equal to '11' and shall set 169 data bits
31 to any desired value. The resulting 171 information bits shall be supplied to the
32 multiplex sublayer as a Rate 1 data block.

33 2.5.2 Processing Delays

34 While Service Option 2, 9, 30, 31, 55, or 75 is connected, the mobile station shall maintain
35 a fixed delay (as measured at the antenna connector) between Forward Traffic Channel
36 frames it receives and their corresponding Reverse Traffic Channel frames produced from
37 the data blocks generated by Service Option 2, 9, 30, 31, 55, or 75 as specified in 2.5.1.
38 The value of the delay shall not vary during a call. The value of the delay shall not be less
39 than two frames and shall not exceed eight frames.

40



1 * either Fundamental Code Channel frame or Forward Supplemental Code Channel frame, depending
 2 upon the Loopback service.

3 **Figure 2.5.2-1. Allowable Mobile Station Processing Delays**

4 2.6 Counters and Messages for Service Option 75

5 2.6.1 Counters

6 The mobile station shall support the counters that correspond to the F-ACKCH.

7 **Table 2.6.1-1 Receive Counters for the F-ACKCH**

Counter Type	Counter Name
F-ACKCH expected ACK received ACK	LSO_FACKCH_EACK_RACK
F-ACKCH expected ACK received NAK	LSO_FACKCH_EACK_RNAK
F-ACKCH expected NAK received NAK	LSO_FACKCH_ENAK_RNAK
F-ACKCH expected NAK received ACK	LSO_FACKCH_ENAK_RACK

8 2.6.2 Mobile Station Processing

9 When LSO receives a *Service Option Control Message* (see 2.6.4), the mobile station shall
 10 perform the following at the **action time** associated with the message:

11 If the CTL_REC_TYPE field is equal to '00000000' (FCH), the mobile station shall perform
 12 the basic data block processing described in 2.5.1.6.

13 If the CTL_REC_TYPE field is equal to '00000001' (R-FCH 0 bps), the mobile station shall
 14 perform the following processing:

- 15 • the LSO shall supply the 1/8-noncritical data block type with all 1's and CAT_TYPE
 16 '11' to the multiplex sublayer if there is no blank rate restriction.

- 1 • the LSO shall supply the blank data block type to the multiplex sublayer if there is a
2 blank rate restriction.

3 If the CTL_REC_TYPE field is equal to '00000010' (R-ACKCH1), the mobile station shall
4 perform the following processing:

- 5 • If ACK_OR_NAK is set to '00000000', the mobile station is to transmit ACK or NAK in
6 accordance with the R-ACKCH1 procedures specified in [6].
7 • If ACK_OR_NAK is set to '00000001', the mobile station is to transmit ACK every
8 frame at the PCG corresponding the 1 in the ACK mask.
9 • If ACK_OR_NAK is set to '00000010', the mobile station is to transmit NAK every
10 frame at the PCG corresponding to the 1 in the ACK mask.

11 If the CTL_REC_TYPE field is equal to '00000011' (F-ACKCH), the mobile station shall
12 perform the following processing:

- 13 • If CLEAR_COUNTERS is set to '00000000', the mobile station shall clear all F-
14 ACKCH receive counters in Table to zero.
15 • If CLEAR_COUNTERS is set to '00000001', the mobile station shall clear
16 LSO_FACKCH_EACK_RACK and LSO_FACKCH_EACK_RANK to zero.
17 • If CLEAR_COUNTERS is set to '00000010', the mobile station shall clear
18 LSO_FACKCH_ENAK_RNAK and LSO_FACKCH_ENAK_RACK to zero.

19 If the CTL_REC_TYPE field is equal to '00000100' (Counter Retrieval), the mobile station
20 shall perform the following processing:

- 21 • Form a response in accordance with 2.6.5.
22 • The mobile station shall then send the response at a time later than the action time
23 of the received *Service Option Control Message*.

24 If the CTL_REC_TYPE field is equal to '00000101' (R-ACKCH2), the mobile station shall
25 perform the following processing:

- 26 • If ACK_OR_NAK is set to '00000000', the mobile station is to transmit ACK or NAK in
27 accordance with the R-ACKCH2 procedures specified in [6].
28 • If ACK_OR_NAK is set to '00000001', the mobile station is to transmit ACK every
29 frame at the PCG corresponding the 1 in the ACK mask.
30 • If ACK_OR_NAK is set to '00000010', the mobile station is to transmit NAK every
31 frame at the PCG corresponding to the 1 in the ACK mask.

32 The default value for the CTL_REC_TYPE field at the mobile station is equal to '00000000'.

33 2.6.3 Base Station Processing

34 When LSO at base station sends a *Service Option Control Message* (see 2.6.4), the base
35 station shall perform the following at the action time associated with the message:

36 If the CTL_REC_TYPE field is equal to '00000011', the base station shall perform the
37 following processing:

- If ACK_OR_NAK is set to '00000000', the base station is to transmit ACK or NAK in accordance with the FACKCH procedures specified in [6].
- If ACK_OR_NAK is set to '00000001', the base station is to transmit ACK every frame at the PCG corresponding the 1 in the ACK mask.
- If ACK_OR_NAK is set to '00000010', the base station is to transmit NAK every frame at the PCG corresponding to the 1 in the ACK mask.

2.6.4 Base Station Message Formats

If the base station sends a *Service Option Control Message*, it shall set the CTL_REC_TYPE field to the value shown in Table 2.6.4-1 corresponding to the desired directive.

Table 2.6.4-1 CTL_REC_TYPE Codes

CTL_REC_TYPE	Type of Directive
'00000000'	Control Directive for FCH
'00000001'	Control Directive for R-FCH 0 bps
'00000010'	Control Directive for R-ACKCH1
'00000011'	Control Directive for F-ACKCH
'00000100'	Counter Retrieval Directive
'00000101'	Control Directive for R-ACKCH2
'00000110' – '11111111'	Reserved

2.6.4.1 Control Directive for FCH

When the base station sends a *Service Option Control Message* to invoke control action for FCH testing, it shall include the Type-specific fields as specified in Table 2.6.4.1-1.

Table 2.6.4.1-1 Type-specific Fields in a Service Option Control Message corresponding to Control Directive for FCH

Field	Length (bits)
CTL_REC_TYPE ('00000000')	8

CTL_REC_TYPE Control record type field.

The base station shall set this field to '00000000' to signify FCH testing.

2.6.4.2 Control Directive for R-FCH 0 bps

When the base station sends a *Service Option Control Message* to invoke control action for R-FCH 0 bps testing, it shall include the Type-specific fields as specified in Table 2.6.4.2-1.

1 **Table 2.6.4.2-1 Type-specific Fields in a Service Option Control Message**
 2 **corresponding to Control Directive for R-FCH 0 bps**

Field	Length (bits)
CTL_REC_TYPE ('00000001')	8

3 CTL_REC_TYPE Control record type field.

4 The base station shall set this field to '00000001' to signify R-
 5 FCH 0 bps testing.

6 2.6.4.3 Control Directive for R-ACKCH1

7 When the base station sends a *Service Option Control Message* to invoke control action for
 8 R-ACKCH1 in a mobile, it shall include the Type-specific fields as specified in Table
 9 2.6.4.3-1. The mobile station shall be in a call with an ACK mask for the F-FCH that has a
 10 single bit set to 1, the PCG index associated with which can be any value in the set {1, 2, 3,
 11 ..., 14}.

12 **Table 2.6.4.3-1 Type-specific Fields in a Service Option Control Message**
 13 **corresponding to Control Directive for R-ACKCH1**

Field	Length (bits)
CTL_REC_TYPE ('00000010')	8
ACK_OR_NAK	8

14 CTL_REC_TYPE Control record type field.

15 The base station shall set this field to '00000010' to signify
 16 control directive for R-ACKCH1.

17 ACK_OR_NAK R-ACKCH1 value field.

18 The base station shall set this field to '00000000' if the mobile
 19 station is to transmit ACK or NAK in accordance with the R-
 20 ACKCH1 procedures specified in [6].

21 The base station shall set this field to '00000001' if the mobile
 22 station is to transmit ACK every frame at the PCG
 23 corresponding to the 1 in the ACK mask.

24 The base station shall set this field to '00000010' if the mobile
 25 station is to transmit NAK every frame at the PCG
 26 corresponding to the 1 in the ACK mask.

27 2.6.4.4 Control Directive for F-ACKCH

28 When the base station sends a *Service Option Control Message* to invoke control action for
 29 the F-ACKCH in a mobile, it shall include the Type-specific fields as specified in Table
 30 2.6.4.4-1. The mobile station shall be in a call with an ACK mask for R-FCH that has a
 31 single bit set to 1, the PCG index associated which can be any value in the set {2, 4, 6, ...,
 32 14}.

Table 2.6.4.4-1. Type-specific Fields in a Service Option Control Message corresponding to Control Directive for F-ACKCH

Field	Length (bits)
CTL_REC_TYPE ('00000011')	8
ACK_OR_NAK	8
CLEAR_COUNTERS	8

CTL_REC_TYPE Control record type field.
The base station shall set this field to '00000011' to signify test control directive for F-ACKCH.

ACK_OR_NAK F-ACKCH value field.
The base station shall set this field to '00000000' if the base station is to transmit ACK or NAK in accordance with the F-ACKCH procedures specified in [6].

The base station shall set this field to '00000001' if the base station is to transmit ACK every frame at the PCG corresponding to the 1 in the ACK mask.

The base station shall set this field to '00000010' if the base station is to transmit NAK every frame at the PCG corresponding to the 1 in the ACK mask.

CLEAR_COUNTERS Clear counter field.
The base station shall set this field to '00000000' if the mobile station is to clear all F-ACKCH receive counters to zero.
The base station shall set this field to '00000001' if the mobile station is to clear LSO_FACKCH_EACK_RACK and LSO_FACKCH_EACK_RNAK to zero.
The base station shall set this field to '00000010' if the mobile station is to clear LSO_FACKCH_ENAK_RACK and LSO_FACKCH_ENAK_RNAK to zero.

2.6.4.5 Counter Retrieval Directive

When the base station sends a *Service Option Control Message* to retrieve counter values from the, it shall include the Type-specific fields as specified in Table 2.6.4.5-1.

Table 2.6.4.5-1. Type-specific Fields in a Service Option Control Message used for Counter Retrieval from the Mobile Station

Field	Length (bits)
CTL_REC_TYPE ('00000100')	8
VECT_COUNTER_ID	8

CTL_REC_TYPE Control record type field.
The base station shall set this field to '00000100' to signify counter retrieval directive.

1 VECT_COUNTER_ID Vector counter identification field.
 2 The base station shall set this field to correspond to the value
 3 shown in Table 2.6.4.5-2 corresponding to the desired vector
 4 of counter values.

5 **Table 2.6.4.5-2. VECT_COUNTER_ID Codes**

VECT_COUNTER_ID	Vector Name
'00000000'	F-ACKCH Receive Counters
'00000001' - '11111111'	Reserved

6 2.6.4.6 Control Directive for R-ACKCH2

7 When the base station sends a *Service Option Control Message* to invoke control action for
 8 R-ACKCH2 in a mobile, it shall include the Type-specific fields as specified in Table
 9 2.6.4.6-1. The mobile station shall be in a call with an ACK mask for the F-FCH that has a
 10 single bit set to 1, the PCG index associated with which can be any value in the set {1, 2, 3,
 11 ..., 14}.

12 **Table 2.6.4.6-1. Type-specific Fields in a Service Option Control Message**
 13 **corresponding to Control Directive for R-ACKCH2**

Field	Length (bits)
CTL_REC_TYPE ('00000101')	8
ACK_OR_NAK	8

14 CTL_REC_TYPE Control record type field.
 15 The base station shall set this field to '00000101' to signify
 16 control directive for R-ACKCH2.

17 ACK_OR_NAK R-ACKCH2 value field.
 18 The base station shall set this field to '00000000' if the mobile
 19 station is to transmit ACK or NAK in accordance with the R-
 20 ACKCH1 procedures specified in [6].

21 The base station shall set this field to '00000001' if the mobile
 22 station is to transmit ACK every frame at the PCG
 23 corresponding to the 1 in the ACK mask.

24 The base station shall set this field to '00000010' if the mobile
 25 station is to transmit NAK every frame at the PCG
 26 corresponding to the 1 in the ACK mask.

27 2.6.5 Mobile Station Message Formats

28 2.6.5.1 F-ACKCH Receive Counters Response

29 When the mobile station sends an *F-ACKCH Receive Counters Response*, it shall include the
 30 following Type-specific fields in the *Service Option Control Message*:

Table 2.6.5.1-1. Type-specific Fields in a Service Option Control Message corresponding to F-ACKCH Receive Counters Response

Field	Length (bits)
CTL_REC_TYPE ('00000100')	8
VECT_COUNTER_ID ('00000000')	8
LSO_FACKCH_EACK_RACK	24
LSO_FACKCH_EACK_RNAK	24
LSO_FACKCH_ENAK_RNAK	24
LSO_FACKCH_ENAK_RACK	24

CTL_REC_TYPE	Control record type field. The mobile station shall set this field to '00000100'.
VECT_COUNTER_ID	Vector counter identification field. The mobile station shall set this field to '00000000'.
LSO_FACKCH_EACK_RACK	Counter for the number of ACK's received on the F-ACKCH, given that ACK's are expected.
LSO_FACKCH_EACK_RNAK	Counter for the number of NAK's received on the F-ACKCH, given that ACK's are expected.
LSO_FACKCH_ENAK_RACK	Counter for the number of NAK's received on the F-ACKCH, given that ACK's are expected.
LSO_FACKCH_ENAK_RNAK	Counter for the number of NAK's received on the F-ACKCH, given that NAK's are expected.

2.7 Computing Error Rate Statistics at the Base Station

The receiving side of Service Option 2, 9, 30, 31, or 55 within the base station should compute both Forward Traffic Channel and Reverse Traffic Channel frame error rates as described in the following sections.

2.7.1 Forward Traffic Channel Frame Error Rates

2.7.1.1 Forward Fundamental Code Channel Frame Error Rate

If the Reverse Fundamental Code Channel is error free, the error rate for fundamental data blocks transmitted on the Forward Fundamental Code Channel can be computed as follows:

Define the following indicator variables for Rate x:

- I_x is equal to 1 if the base station generated a Rate x fundamental data block for the frame; otherwise, I_x is equal to 0;
- I_{xx} is equal to 1 if all the following conditions are met:
 - The base station generates a Rate x fundamental data block for the frame,
 - The base station receives a Rate x fundamental data block with no errors, and

- 1 - The received CAT_TYPE is equal to '00'.
 2 Otherwise, I_{xx} is equal to 0;
- 3 • I_{xb} is equal to 1 if all the following conditions are met:
- 4 - The base station generates a Rate x fundamental data block for the frame, and
 5 - The base station receives a Blank fundamental data block.
 6 Otherwise, I_{xb} is equal to 0;
- 7 • I_{1d} is equal to 1 if all the following conditions are met:
- 8 - The base station generates a Rate 1 fundamental data block for the frame, and
 9 - The base station receives a Rate 1/2 fundamental data block with CAT_TYPE
 10 equal to '11'.
 11 Otherwise, I_{1d} is equal to 0.

12 The error rate for Rate 1 fundamental data blocks ($FDBER_1$) is:

$$13 \quad FDBER_1 = 1 - \frac{\sum I_{11}}{\sum (I_1 - I_{1b} - I_{1d})},$$

14 and the error rate for Rate 1/2, Rate 1/4, and Rate 1/8 fundamental data blocks
 15 ($FDBER_{1/2}$, $FDBER_{1/4}$, and $FDBER_{1/8}$) is:

$$16 \quad FDBER_x = 1 - \frac{\sum I_{xx}}{\sum (I_x - I_{xb})},$$

17 where the summation is taken over the measurement interval. When secondary traffic is
 18 not being used, the Forward Fundamental Code Channel frame error rate is approximately
 19 the fundamental data block error rate.

20 2.7.1.2 Forward Supplemental Code Channel Frame Error Rate

21 If the Reverse Fundamental Code Channel is error free, the error rate for supplemental
 22 data blocks transmitted on the Forward Supplemental Code Channel can be computed as
 23 follows:

24 Define the following indicator variables for Rate 1:

- 25 • I_1 is equal to 1 if the base station generated a Rate 1 supplemental data block for the
 26 frame; otherwise, I_1 is equal to 0;
- 27 • I_{11} is equal to 1 if all the following conditions are met:
- 28 - The base station generates a Rate 1 supplemental data block for the frame,
 29 - The base station receives a Rate 1 fundamental data block with no errors, and
 30 - The received CAT_TYPE is equal to '00'.
 31 Otherwise, I_{11} is equal to 0;
- 32 • I_{1b} is equal to 1 if all the following conditions are met:

- 1 - The base station generates a Rate 1 supplemental data block for the frame, and
- 2 - The base station receives a Blank fundamental data block.

3 Otherwise, I_{1b} is equal to 0;

- 4 • I_{1d} is equal to 1 if all the following conditions are met:

- 5 - The base station generates a Rate 1 supplemental data block for the frame, and
- 6 - The base station receives a Rate 1/2 fundamental data block with CAT_TYPE
- 7 equal to '11'.

8 Otherwise, I_{1d} is equal to 0.

9 The error rate for Rate 1 supplemental data blocks ($SDBER_1$) is:

$$10 \quad SDBER_1 = 1 - \frac{\sum I_{11}}{\sum (I_1 - I_{1b} - I_{1d})},$$

11 where the summation is taken over the measurement interval. When secondary traffic is
12 not being used, the Forward Supplemental Code Channel frame error rate is approximately
13 the supplemental data block error rate.

14 2.7.1.3 Forward Fundamental Channel Frame Error Rate for SO 75

15 If the Reverse Fundamental Channel is error free for nonzero rate transmissions, the error
16 rate for fundamental data blocks transmitted on the Forward Fundamental Channel can be
17 computed as follows:

18 Define the following indicator variables for Rate x (x = '1', '1/2', '1/4', '1/8'):

- 19 • I_x is equal to 1 if the base station generates a Rate x fundamental data block for the
20 frame; otherwise, I_x is equal to 0;
- 21 • $I_{xx,n}$ is equal to 1 if all the following conditions are met:
 - 22 - The base station generates a Rate x fundamental data block for the frame,
 - 23 - The base station receives a Rate x fundamental data block with no errors,
 - 24 - ACK is received in PCG index less than or equal to n, and
 - 25 - The received CAT_TYPE is equal to '00'.

26 Otherwise, $I_{xx,n}$ is equal to 0;

- 27 • I_{xb} is equal to 1 if all the following conditions are met:

- 28 - The base station generates a Rate x fundamental data block for the frame, and
- 29 - The base station receives a Blank fundamental data block from a blank-and-
30 burst Fundamental Channel frame.

31 Otherwise, I_{xb} is equal to 0;

- 32 • I_{1d} is equal to 1 if all the following conditions are met:

- 33 - The base station generates a Rate 1 fundamental data block for the frame, and

- 1 - The base station receives a Rate 1/2 fundamental data block with CAT_TYPE
2 equal to '11'.

3 Otherwise, I_{1d} is equal to 0.

4 The error rate for Rate 1 fundamental data blocks ($FDBER_1$) is:

$$5 \quad FDBER_{1,n} = 1 - \frac{\sum I_{11,n}}{\sum (I_1 - I_{1b} - I_{1d})},$$

6 and the error rate for Rate 1/2, Rate 1/4, and Rate 1/8 fundamental data blocks
7 ($FDBER_{1/2,n}$, $FDBER_{1/4,n}$, and $FDBER_{1/8,n}$) is:

$$8 \quad FDBER_{x,n} = 1 - \frac{\sum I_{xx,n}}{\sum (I_x - I_{xb})},$$

9 where the summation is taken over the measurement interval.

10 Define the following indicator variables for Rate 0:

- 11 • I_0 is equal to 1 if the following condition is met:

- 12 - The base station generates a 1/8 Non-critical fundamental data block for the
13 frame and it is mapped into a 0 bps Fundamental Channel frame; otherwise, I_x
14 is equal to 0;

- 15 • I_{01} is equal to 1 if all the following conditions are met:

- 16 - The base station generates a Rate 1/8 Non-critical fundamental data block for
17 the frame and it is mapped into a 0 bps Fundamental Channel frame, and
18 - The base station receives a Rate 1 fundamental data block with CAT_TYPE equal
19 to '11',

20 Otherwise, I_{00} is equal to 0;

- 21 • I_{0d} is equal to 1 if all the following conditions are met:

- 22 - The base station generates a Rate 1/8 Non-critical fundamental data block for
23 the frame and it is mapped into a 0 bps Fundamental Channel frame,
24 - The base station receives a Rate 1/8 fundamental data block with CAT_TYPE
25 equal to '11'.

26 Otherwise, I_{0d} is equal to 0;

- 27 • I_{0b} is equal to 1 if all the following conditions are met:

- 28 - The base station generates a Rate 1/8 Non-critical fundamental data block for
29 the frame and it is mapped into a 0 bps Fundamental Channel frame,
30 - The base station receives a Blank fundamental data block.

31 Otherwise, I_{0b} is equal to 0;

32 The error rate for 0 bps Fundamental Channel frame (FER_0) is:

$$FER_0 = 1 - \frac{\sum(I_{01} + I_{0d})}{\sum(I_0 - I_{0b})},$$

where the summation is taken over the measurement interval. When secondary traffic is not being used, the Forward Fundamental Channel frame error rate is approximately the fundamental data block error rate. The computation of FER_0 is valid only when `FOR-FCH_BLANKING_DUTYCYCLE` has a value greater than 0.

2.7.2 Reverse Traffic Channel Frame Error Rates

2.7.2.1 Reverse Fundamental Code Channel Frame Error Rate

For Service Option 2 and 9, if the Forward Fundamental Code Channel is error free, the error rate for fundamental data blocks transmitted on the Reverse Fundamental Code Channel can be computed as described in 2.7.1.1.

For Service Option 30 and 31, if the Forward Supplemental Code Channel is error free, the error rate for fundamental data blocks transmitted on the Reverse Fundamental Code Channel can be computed as described in 2.7.1.2.

2.7.2.2 Reverse Supplemental Code Channel Frame Error Rate

The Loopback service option does not support computing of the Reverse Supplemental Code Channel frame error rate.

2.7.2.3 Reverse Fundamental Channel Frame Error Rate for SO 75

If the Forward Fundamental Channel is error free for nonzero rate transmissions, the error rate for Rate 1, 1/2, 1/4, and 1/8 fundamental data blocks transmitted on the Reverse Fundamental Channel can be computed as described in 2.7.1.3.

If the mobile station is in the test mode for R-FCH 0 bps, the error rate for 0 bps frame transmitted on the Reverse Fundamental Channel can be computed as follows:

Define the following indicator variables for Rate 0:

- I_0 is equal to 1 if all the following conditions are met:
 - $(FRAME_NUMBER + FRAME_OFFSET) \bmod M \neq 0$; where $M = 1, 4, 8$ for $= REV-FCH_BLANKING_DUTY_CYCLE_IN_USE = 0, 1, 2$,
 Otherwise, I_x is equal to 0;
- I_{00} is equal to 1 if all the following conditions are met:
 - The base station receives an erasure
 - $(FRAME_NUMBER + FRAME_OFFSET) \bmod M \neq 0$,
 Otherwise, I_{00} is equal to 0;
- I_{0d} is equal to 1 if all the following conditions are met:
 - The base station receives an Rate 1/8 fundamental data of all 1's with `CAT_TYPE` equal to '11'

- 1 - (FRAME_NUMBER + FRAME_OFFSET) mod M ≠ 0,
 2 Otherwise, I_{0d} is equal to 0;
- 3 • I_{0b} is equal to 1 if all the following conditions are met:
- 4 - The base station receives a Blank fundamental data block
 5 - (FRAME_NUMBER + FRAME_OFFSET) mod M ≠ 0,
 6 Otherwise, I_{0b} is equal to 0;

7 The error rate for 0 bps Fundamental Channel frame (FER₀) is:

$$8 \quad FER_0 = 1 - \frac{\sum I_{00}}{\sum (I_0 - I_{0d} - I_{0b})},$$

9 where the summation is taken over the measurement interval. When secondary traffic is
 10 not being used, the Forward Fundamental Channel frame error rate is approximately the
 11 fundamental data block error rate. The computation of FER₀ is valid only when REV-
 12 FCH_BLANKING_DUTYCYCLE_IN_USE has a value greater than 0.

13 2.7.2.4 Reverse Acknowledgement Channel 1 and 2 Error Rate for SO 75

14 Define the following indicator variables for R-ACKCH1 and R-ACKCH2:

- 15 • I_{ACK} is equal to 1 if the mobile station generates an ACK for the frame; otherwise,
 16 I_{ACK} is equal to 0;
- 17 • I_{NAK} is equal to 1 if the mobile station generates an NAK for the frame; otherwise,
 18 I_{NAK} is equal to 0;
- 19 • I_{ACK|ACK} is equal to 1 if all the following conditions are met:
- 20 - The mobile station generates an ACK for the frame,
 21 - The base station receives an ACK with no errors, and
 22 Otherwise, I₁ is equal to 0;
- 23 • I_{NAK|NAK} is equal to 1 if all the following conditions are met:
- 24 - The mobile station generates a NAK for the frame, and
 25 - The base station receives a NAK.
 26 Otherwise, I₀ is equal to 0;

27 The ACK-to-NAK error rate (BER_{NAK|ACK}) is:

$$28 \quad BER_{NAK|ACK} = 1 - \frac{\sum I_{ACK|ACK}}{\sum I_{ACK}},$$

29 The NAK-to-ACK error rate (BER_{ACK|NAK}) is:

$$30 \quad BER_{ACK|NAK} = 1 - \frac{\sum I_{NAK|NAK}}{\sum I_{NAK}},$$

31

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