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Technical Specification

GEO-Mobile Radio Interface Specifications;
Part 5: Radio interface physical layer specifications;
Sub-part 2: Multiplexing and Multiple Access on the Radio Path;
GMR-2 05.002

Reference

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ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
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IPRs:

Project	Company	Title	Country of Origin	Patent n°	Countries Applicable
TS 101 377 V1.1.1	Digital Voice Systems Inc		US	US 5,715,365	US
TS 101 377 V1.1.1	Digital Voice Systems Inc		US	US 5,754,974	US
TS 101 377 V1.1.1	Digital Voice Systems Inc		US	US 5,226,084	US
TS 101 377 V1.1.1	Digital Voice Systems Inc		US	US 5,701,390	US
TS 101 377 V1.1.1	Digital Voice Systems Inc		US	US 5,826,222	US

IPR Owner: Digital Voice Systems Inc
One Van de Graaff Drive Burlington,
MA 01803
USA

Contact: John C. Hardwick
Tel.: +1 781 270 1030
Fax: +1 781 270 0166

Project	Company	Title	Country of Origin	Patent n°	Countries Applicable
TS 101 377 V1.1.1	Ericsson Mobile Communication	Improvements in, or in relation to, equalisers	GB	GB 2 215 567	GB
TS 101 377 V1.1.1	Ericsson Mobile Communication	Power Booster	GB	GB 2 251 768	GB
TS 101 377 V1.1.1	Ericsson Mobile Communication	Receiver Gain	GB	GB 2 233 846	GB
TS 101 377 V1.1.1	Ericsson Mobile Communication	Transmitter Power Control for Radio Telephone System	GB	GB 2 233 517	GB

IPR Owner: Ericsson Mobile Communications (UK) Limited
The Keytech Centre, Ashwood Way
Basingstoke
Hampshire RG23 8BG
United Kingdom

Contact: John Watson
Tel.: +44 1256 864 821

Project	Company	Title	Country of Origin	Patent n°	Countries Applicable
TS 101 377 V1.1.1	Hughes Network Systems		US	Pending	US

IPR Owner: Hughes Network Systems
11717 Exploration Lane
Germantown, Maryland 20876
USA

Contact: John T. Whelan
Tel: +1 301 428 7172
Fax: +1 301 428 2802

Project	Company	Title	Country of Origin	Patent n°	Countries Applicable
TS 101 377 V1.1.1	Lockheed Martin Global Telecommunic. Inc	2.4-to-3 KBPS Rate Adaptation Apparatus for Use in Narrowband Data and Facsimile Communication Systems	US	US 6,108,348	US
TS 101 377 V1.1.1	Lockheed Martin Global Telecommunic. Inc	Cellular Spacecraft TDMA Communications System with Call Interrupt Coding System for Maximizing Traffic ThroughputCellular Spacecraft TDMA Communications System with Call Interrupt Coding System for Maximizing Traffic Throughput	US	US 5,717,686	US
TS 101 377 V1.1.1	Lockheed Martin Global Telecommunic. Inc	Enhanced Access Burst for Random Access Channels in TDMA Mobile Satellite System	US	US 5,875,182	
TS 101 377 V1.1.1	Lockheed Martin Global Telecommunic. Inc	Spacecraft Cellular Communication System	US	US 5,974,314	US
TS 101 377 V1.1.1	Lockheed Martin Global Telecommunic. Inc	Spacecraft Cellular Communication System	US	US 5,974,315	US
TS 101 377 V1.1.1	Lockheed Martin Global Telecommunic. Inc	Spacecraft Cellular Communication System with Mutual Offset High-argin Forward Control Signals	US	US 6,072,985	US
TS 101 377 V1.1.1	Lockheed Martin Global Telecommunic. Inc	Spacecraft Cellular Communication System with Spot Beam Pairing for Reduced Updates	US	US 6,118,998	US

IPR Owner: Lockheed Martin Global Telecommunications, Inc.
900 Forge Road
Norristown, PA. 19403
USA

Contact: R.F. Franciose
Tel.: +1 610 354 2535
Fax: +1 610 354 7244

Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Satellite Earth Stations and Systems (SES).

The contents of the present document are subject to continuing work within TC-SES and may change following formal TC-SES approval. Should TC-SES modify the contents of the present document it will then be republished by ETSI with an identifying change of release date and an increase in version number as follows:

Version 1.m.n

where:

- the third digit (n) is incremented when editorial only changes have been incorporated in the specification;
- the second digit (m) is incremented for all other types of changes, i.e. technical enhancements, corrections, updates, etc.

The present document is part 5, sub-part 2 of a multi-part deliverable covering the GEO-Mobile Radio Interface Specifications, as identified below:

Part 1: "General specifications";

Part 2: "Service specifications";

Part 3: "Network specifications";

Part 4: "Radio interface protocol specifications";

Part 5: "Radio interface physical layer specifications";

Sub-part 1: "Physical Layer on the Radio Path; GMR-2 05.001";

Sub-part 2: "Multiplexing and Multiple Access on the Radio Path; GMR-2 05.002";

Sub-part 3: "Channel Coding; GMR-2 05.003";

Sub-part 4: "Modulation; GMR-2 05.004";

Sub-part 5: "Radio Transmission and Reception; GMR-2 05.005";

Sub-part 6: "Radio Subsystem Link Control; GMR-2 05.008";

Sub-part 7: "Radio Subsystem Synchronization; GMR-2 05.010";

Part 6: "Speech coding specifications".

Introduction

GMR stands for GEO (Geostationary Earth Orbit) Mobile Radio interface, which is used for mobile satellite services (MSS) utilizing geostationary satellite(s). GMR is derived from the terrestrial digital cellular standard GSM and supports access to GSM core networks.

Due to the differences between terrestrial and satellite channels, some modifications to the GSM standard are necessary. Some GSM specifications are directly applicable, whereas others are applicable with modifications. Similarly, some GSM specifications do not apply, while some GMR specifications have no corresponding GSM specification.

Since GMR is derived from GSM, the organization of the GMR specifications closely follows that of GSM. The GMR numbers have been designed to correspond to the GSM numbering system. All GMR specifications are allocated a unique GMR number as follows:

GMR-n xx.zyy

where:

- xx.0yy (z = 0) is used for GMR specifications that have a corresponding GSM specification. In this case, the numbers xx and yy correspond to the GSM numbering scheme.
- xx.2yy (z = 2) is used for GMR specifications that do not correspond to a GSM specification. In this case, only the number xx corresponds to the GSM numbering scheme and the number yy is allocated by GMR.
- n denotes the first (n = 1) or second (n = 2) family of GMR specifications.

A GMR system is defined by the combination of a family of GMR specifications and GSM specifications as follows:

- If a GMR specification exists it takes precedence over the corresponding GSM specification (if any). This precedence rule applies to any references in the corresponding GSM specifications.

NOTE: Any references to GSM specifications within the GMR specifications are not subject to this precedence rule. For example, a GMR specification may contain specific references to the corresponding GSM specification.

- If a GMR specification does not exist, the corresponding GSM specification may or may not apply. The applicability of the GSM specifications is defined in GMR-n 01.201.

1 Scope

The present document defines the physical channels of the radio sub-system required to support the logical channels. It includes a description of the logical channels and the definition of TDMA frames, timeslots, and bursts.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication and/or edition number or version number) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

[1] GMR-2 01.004 (ETSI TS 101 377-1-1): "GEO-Mobile Radio Interface Specifications; Part 1: General specifications; Sub-part 1: Abbreviations and Acronyms; GMR-2 01.004".

[2] GMR-2 03.003 (ETSI TS 101 377-3-3): "GEO-Mobile Radio Interface Specifications; Part 3: Network specifications; Sub-part 3: Numbering, Addressing and Identification; GMR-2 03.003".

[3] GMR-2 04.003 (ETSI TS 101 377-4-2): "GEO-Mobile Radio Interface Specifications; Part 4: Radio interface protocol specifications; Sub-part 2: GMR-2 Mobile Earth Station-Network Interface; Channel Structures and Access capabilities; GMR-2 04.003".

[4] GMR-2 04.006 (ETSI TS 101 377-4-5): "GEO-Mobile Radio Interface Specifications; Part 4: Radio interface protocol specifications; Sub-part 5: GMR-2 Mobile Earth Station - Network Interface; Data Link (DL) layer Specifications; GMR-2 04.006".

[5] GMR-2 04.008 (ETSI TS 101 377-4-7): "GEO-Mobile Radio Interface Specifications; Part 4: Radio interface protocol specifications; Sub-part 7: Mobile radio interface Layer 3 Specifications; GMR-2 04.008".

[6] GMR-2 05.003 (ETSI TS 101 377-5-3): "GEO-Mobile Radio Interface Specifications; Part 5: Radio interface physical layer specifications; Sub-part 3: Channel Coding; GMR-2 05.003".

[7] GMR-2 05.004 (ETSI TS 101 377-5-4): "GEO-Mobile Radio Interface Specifications; Part 5: Radio interface physical layer specifications; Sub-part 4: Modulation; GMR-2 05.004".

[8] GMR-2 05.005 (ETSI TS 101 377-5-5): "GEO-Mobile Radio Interface Specifications; Part 5: Radio interface physical layer specifications; Sub-part 5: Radio Transmission and Reception; GMR-2 05.005".

[9] GMR-2 05.008 (ETSI TS 101 377-5-6): "GEO-Mobile Radio Interface Specifications; Part 5: Radio interface physical layer specifications; Sub-part 6: Radio Subsystem Link Control; GMR-2 05.008".

[10] GMR-2 05.010 (ETSI TS 101 377-5-7): "GEO-Mobile Radio Interface Specifications; Part 5: Radio interface physical layer specifications; Sub-part 7: Radio Subsystem Synchronisation; GMR-2 05.010".

[11] GMR-2 05.001 (ETSI TS 101 377-5-1): "GEO-Mobile Radio Interface Specifications; Part 5: Radio interface physical layer specifications; Sub-part 1: Physical Layer on the Radio Path; GMR-2 05.001".

3 Abbreviations

For the purposes of the present document, the abbreviations given in GMR-2 01.004 [1] apply.

4 General

The SAI is required to support a certain number of logical channels that can be separated into two overall categories as defined in GMR-2 04.003 [3]:

a) Traffic channels (S-TCH's);

b) Control channels.

Clause 5 of the present document gives more detail about these logical channels and defines a number of special channels used on the Satellite Air Interface (SAI). Clause 6 describes the physical resource available to the SAI. Clause 7 defines physical channels based on that resource. Clause 8 specifies how the logical channels shall be mapped onto physical channels.

5 Logical Channels

5.1 General

This clause describes the logical channels that are supported on the satellite air interface.

5.2 Traffic Channels

5.2.1 General

Traffic channels (S-TCH's) are intended to carry either encoded speech or user data. Four forms of traffic channel are defined below.

a) Satellite full-rate traffic channel (S-TCH/F). This channel carries information at a gross rate of 24 kbps.

b) Satellite half-rate traffic channel (S-TCH/H). This channel carries information at a gross rate of 12 kbps.

c) Satellite quarter-rate traffic channel (S-TCH/Q). This channel carries information at a gross rate of 6 kbps.

d) Satellite eighth-rate traffic channel (S-TCH/E). This channel carries information at a gross rate of 3 kbps.

The specific traffic channels available in the categories of speech and user data are defined in the following clauses.

5.2.2 Speech Traffic Channels

The following traffic channels are defined to carry encoded speech:

1) Satellite half-rate traffic channel for enhanced speech (S-TCH/HES);

2) Satellite half-rate traffic channel for robust speech (S-TCH/HRS);

3) Satellite quarter-rate traffic channel for basic speech (S-TCH/QBS);

4) Satellite eighth-rate traffic channel for low-rate speech (S-TCH/ELS).

NOTE: The full-rate traffic channel defined in GSM is not used for speech over the satellite.

Timeslot/frame usage for the speech traffic channels is illustrated in figures 9.0.1 and 9.0.2. Further detail on the traffic multiframe is provided in clause 6.3.3. More information on the frame/timeslot usage is provided in clauses 8 and 9.

5.2.3 Data Traffic Channels

The following traffic channels are defined to carry user data:

1) Satellite full-rate traffic channel for 9,6 kbps user data (S-TCH/F9,6);

2) Satellite half-rate traffic channel for 4,8 kbps user data (S-TCH/H4,8);

3) Satellite half-rate robust traffic channel for 2,4 kbps user data (S-TCH/HR2,4);

4) Satellite quarter-rate traffic channel for 2,4 kbps user data (S-TCH/Q2,4).

NOTE: The eighth-rate traffic channel, as defined above for speech, is not used for data over the satellite.

Timeslot/frame usage for the traffic channels is illustrated in figures 9.0.1 and 9.0.2. Further detail on the traffic multiframe is provided in clause 6.3.3. More information on the frame/timeslot usage is provided in clauses 8 and 9.

5.3 Control Channels

5.3.1 General

Control channels are intended to carry signalling or synchronization data. Three categories of control channel are defined: broadcast, common and dedicated. Specific channels within these categories are defined in the following clauses.

5.3.2 Broadcast Channels

Table 5.3.1 gives the channel designations for the broadcast control channels.

Table 5.3.1: GMR-2 Control Channel Listing

GMR-2 Control Channels
Satellite Synchronization Channel (S-SCH)
Satellite Broadcast Control Channel (S-BCCH)
Satellite High Margin Synchronization Channel (S-HMSCH))
Satellite High Margin Broadcast Control Channel (S-HBCCH)
Satellite Beam Broadcast Channel (S-BBCH)

5.3.2.1 Frequency correction channel (FCCH)

Not used in GMR-2 system

5.3.2.2 Satellite Synchronization Channel (S-SCH)

The satellite synchronization channel provides the frame count and spotbeam ID to the Mobile Earth Station. Information on the synchronization process is provided in GMR-2 05.010 [10]. Specifically, the S-SCH shall contain two encoded parameters:

1) Spotbeam identity code (SBIC): Six bits composed of 3 bits for the satellite network colour code (NCC) with range 0 to 7 and 3 bits for the beam cluster colour code (BCCC) with range 0 to 7 as described in clause 7.2.3.

2) Reduced TDMA frame number (RFN): 19 bits (before channel coding) as shown in the table 5.3.2.

Table 5.3.2: Reduced TDMA Frame Number Composition

Frame type	No. of bits	Range of values	Information (note)
T1	11 bits	Range 0 to 2047	FN/(26 x 51)
T2	5 bits	Range 0 to 25	FN mod 26
T3'	3 bits	Reserved	Reserved
NOTE: FN = TDMA frame number as defined in clause 6.3.3.			

GMR-2 04.006 [4] and GMR-2 04.008 [5] specify the precise bit ordering, GMR-2 05.003 [6] specifies the channel coding of the above parameters, and GMR-2 05.010 [10] defines how the TDMA frame number can be calculated from T1 and T2.

5.3.2.3 Satellite Broadcast Control Channel (S-BCCH)

The satellite broadcast control channel broadcasts general information on a spotbeam by spotbeam basis. Of the many parameters contained in the S-BCCH, the use of the following parameters, as defined in GMR-2 04.008 [5] are referred to in clause 8.5 of the present document:

1) CCCH_CONF, which indicates the organization of the common control channels. From this parameter, the number of common control channels (SB_CC_CHANS) are derived in table 5.3.3 per table 12.5.2-9 of GMR-2 04.008 [5].

Table 5.3.3: Derivation of the Number of Common Control Channels

S-CCCH Type	CCCH_CONF	SB_CC_CHANS
CCCH-0	000	1
Disallowed State	001	N/A
CCCH Ext 1	010	2
CCCH Ext 2	011	3
CCCH Ext 3	100	4

The allowed timeslot numbers (TN's) for S-CCCH channels, S-HPACH channels, and S-RACH channels are as shown in table 5.3.4. The TN's which are activated for S-HPACH channels are determined in accordance with the bit map, SB_HPA_EXT_RES, as defined in table 12.5.2-27 of GMR-2 04.008 [5].

Table 5.3.4: Allowable TN's for Number and Type of S-CCCH

Number of S-CCCH's (SB_CC_CHANS)	S-CCCH Type	S-CCCH Forward TN's	S-RACH Subcarrier Identifier	S-HPACH Forward TN's
1	CCCH-0	0	SB_RACH_0	4, 2, 3, 5, 6
2	CCCH-0	0	SB_RACH_0	4, 3
	CCCH-Ext 1	6	SB_RACH_1	2, 5
3	CCCH-0	0	SB_RACH_0	4, 5
	CCCH-Ext 1	6	SB_RACH_1	2
	CCCH-Ext 2	7	SB_RACH_2	3
4	CCCH-0	0	SB_RACH_0	4
	CCCH-Ext 1	6	SB_RACH_1	2
	CCCH-Ext 2	7	SB_RACH_2	3
	CCCH-Ext 3	1	SB_RACH_3	5

NOTE: These combinations are illustrated again in tables 7.0.1 through 7.0.7.

2) BS_AG_BLKS_RES, per GMR-2 04.008 [5], table 12.5.2.9 which indicates the number of blocks on each common control channel reserved for access grant messages: 5 bits (before channel coding) with range 0 to 21. Only 19 (BCCHext in use) and 21 (BCCHext not in use) shall be implemented.

3) BS_PA_MFRMS, per GMR-2 04.008 [5], table 12.5.2.9 which indicates the number of 102 frame TDMA multiframes (defined in clause 6.3.3) between transmission of paging messages to user terminals of the same paging group: 3 bits (before channel coding) with range 1 to 5.

4) SB_HPA_BLKS_RES, per GMR-2 04.008 [5], table 12.5.2.27 which indicates the number of S-HPACH Subgroups in each TN: 1 bit that specifies the number of paging subgroups as either 5 or 8. Only 5 shall be implemented.

5) SB_HPA_EXT_RES, per GMR-2 04.008 [5], table 12.5.2.27 which indicates the number of S-HPACH TNs reserved: 5 bits that bit map the list of HPAs in the order shown above.

6) S-RACH_Configuration, per GMR-2 04.008 [5], table 12.5.2.2 which indicates the number of return frame periods used for an S-RACH slot on the return link: 3 bits (before channel coding) with range of 2, 3, 4, 5, 6, 7, 8 or 9 frame periods.

7) SB_RACH_X, where X is 0, 1, 2, 3, per the third column of table 5.3.4 in the present document and in GMR-2 04.008 [5], table 12.5.2.2 indicates the mapping to the physical return subchannel associated with the forward TN. Note that per table 5.3.4, X's of 0, 1, 2, and 3 respectively map to return subchannels of 0, 2, 3, and 1.

5.3.2.4 Satellite High Margin Synchronization Channel (S-HMSCH)

The satellite high margin synchronization channel provides frequency correction and synchronization reference to the user terminal. The channel provides the high link margin necessary to be received by user terminals (handsets, in particular), thus allowing the user terminal to sufficiently correct for frequency/time alignment. This process is discussed in detail in GMR-2 05.010 [10].

5.3.2.5 Satellite High Margin Broadcast Control Channel (S-HBCCH)

The satellite high margin broadcast control channel provides the same information as the S-BCCH (see clause 5.3.2.3). The S-HBCCH, however, also provided the high link margin necessary to be received by the user terminals (handsets, in particular), thus allowing the user terminal to obtain the S-BCCH information when in a disadvantaged scenario.

5.3.2.6 Satellite Beam Broadcast Control Channel (S-BBCH) (Option not currently supported by GMR-2 system)

The satellite beam broadcast control channel represents an optional capability for broadcasting a slowly changing system-wide information message. The message is coded per GMR-2 05.003 [6] and is transmitted across the midamble bits of the S-HBCCH per table 9.0.6.

5.3.3 Satellite Common Control Channel (S-CCCH)

Table 5.3.5 identifies the six common control channels used on the GMR-2 system.

Table 5.3.5: GMR-2 Common Control Channels

GMR-2 Common Control Channels
Satellite High Penetration Alerting Channel (S-HPACH)
Satellite Paging Channel (S-PCH)
Satellite Random Access Channel (S-RACH)
Satellite Access Grant Channel (S-AGCH)
Satellite Robust Paging Channel (S-PCH/R) (not supported in GMR-2)
Satellite Robust Access Grant Channel (S-AGCH/R) (not supported by GMR-2)

Brief descriptions of the channels are:

1) Satellite High Penetration Alerting Channel (S-HPACH): Forward only. Uses additional margin to alert users of incoming calls;

2) Satellite Paging Channels (S-PCH and S-PCH/R): Forward only. Used to page User Terminal;

3) Satellite Random Access Channel (S-RACH): Return only. Used to request access to the system;

4) Satellite Access Grant Channels (S-AGCH and S-AGCH/R): Forward only. Used to allocate a channel.

5.3.4 Dedicated Control Channels

The dedicated control channels include three types: standalone dedicated, slow associated, and fast associated control channels. These types are defined in the following clauses.

5.3.4.1 Satellite Standalone Dedicated Control Channel (S-SDCCH)

The standalone dedicated control channels are identified in table 5.3.6. More information on the frame/timeslot structure is provided in clauses 8 and 9.

Table 5.3.6: GMR-2 Dedicated Control Channels

GMR-2 Dedicated Control Channels
Satellite Eighth-Rate Standalone Dedicated Control Channel (S-SDCCH/E)
Satellite Quarter-Rate Standalone Dedicated Control Channel (S-SDCCH/Q)
Satellite Half-Rate Standalone Dedicated Control Channel (S-SDCCH/HR)

5.3.4.2 Satellite Slow Associated Control Channel (S-SACCH)

The eight slow associated control channels are identified in table 5.3.7. Each channel is associated with either a traffic channel or an S-SDCCH. More information on the frame/timeslot structure is provided in clauses 8 and 9. The top five channels are associated with a traffic channel, the last three channels are associated with a dedicated control channel.

Table 5.3.7. GMR-2 Slow Associated Control Channels

GMR-2 Slow Associated Control Channels
Satellite Slow, S-TCH/F Associated, Control Channel (S-SACCH/TF)
Satellite Slow, S-TCH/H Associated, Control Channel (S-SACCH/TH)
Satellite Robust Slow, S-TCH/HR Associated, Control Channel (S-SACCH/THR)
Satellite Slow, S-TCH/Q Associated, Control Channel (S-SACCH/TQ)
Satellite Slow, S-TCH/E Associated, Control Channel (S-SACCH/TE)
Satellite Slow, S-SDCCH/E Associated, Control Channel (S-SACCH/CE)
Satellite Slow, S-SDCCH/Q Associated, Control Channel (S-SACCH/CQ)
Satellite Slow, S-SDCCH/HRE Associated, Control Channel (S-SACCH/CHR)

5.3.4.3 Satellite Fast Associated Control (S-FACCH)

The eight fast associated control channels are identified in the table 5.3.8. These channels are associated with traffic channels. As such, each channel operates on a different frame structure based on half-, quarter-, and eighth-rates. These channels "steal" timeslots from the frames of a traffic multiframe. More information on the frame/timeslot structure is provided in clauses 8 and 9.

Table 5.3.8: GMR-2 Fast Associated Control Channels

GMR-2 Fast Associated Control Channels
Satellite S-TCH/ELS Fast Associated Control Channel (S-FACCH/ELS)
Satellite S-TCH/QBS Fast Associated Control Channel (S-FACCH/QBS)
Satellite S-TCH/HRS Fast Associated Control Channel (S-FACCH/HRS)
Satellite S-TCH/HES Fast Associated Control Channel (S-FACCH/HES)
Satellite S-TCH/Q2.4 Fast Associated Control Channel (S-FACCH/Q2.4)
Satellite S-TCH/HR2.4 Fast Associated Control Channel (S-FACCH/HR2.4)
Satellite S-TCH/H4.8 Fast Associated Control Channel (S-FACCH/H4.8)
Satellite S-TCH/F9.6 Fast Associated Control Channel (S-FACCH/F9.6)

5.3.5 Cell Broadcast Channel (CBCH)

Not used in GMR-2 system.

5.4 Combination of Channels

Only certain combinations of channels are allowed, as defined in GMR-2 04.003 [3]. Clause 8.4 of the present document lists the combinations in relation to basic physical channels.

6 Physical Resource

6.1 General

The physical resource available to the radio sub-system is an allocation of part of the radio spectrum. This resource is partitioned both in frequency and time. Frequency is partitioned by radio frequency (RF) channels divided into bands as defined in GMR-2 05.005 [8]. Time is partitioned by timeslots and TDMA frames as defined in clause 6.3 of the present document.

6.2 Radio Frequency Channels

6.2.1 Spotbeam Allocation and Mobile Earth Station Allocation

GMR-2 05.005 [8] defines radio frequency channels (RFCH's), and allocates numbers to all the L-band radio frequency channels available to the system. The NCC and each Gateway are allocated a subset of these channels for distribution to spotbeams. One radio frequency channel shall be used to carry both synchronization information and the S-BCCH, and shall be known as S-BCCH carrier.

6.2.2 Forward and Return Link

The forward link is a combination of L-band and C-band radio frequency channels used in the NCC/Gateway-to-Mobile Earth Station direction. A forward RF channel is composed of a signal with 200 kHz of uplink bandwidth at C-band and 200 kHz of downlink bandwidth at L-band, with the uplink and downlink bandwidths connected via the digital channelizer onboard the satellite. The 200 kHz bandwidth contains a single modulated carrier, with modulation as defined in GMR-2 05.004 [7]. The modulated carrier is based on a time-multiplexed structure with 8 slots per frame as defined in clause 6.3.1, and with a burst rate as defined in GMR-2 05.001 [11].

The return link is a combination of L-band and C-band radio frequency channels used in the Mobile Earth Station -to-NCC/Gateway direction. A return RF channel is composed of a signal with 200 kHz of uplink bandwidth at L-band and 200 kHz of downlink bandwidth at C-band, with the uplink and downlink bandwidths connected via the digital channelizer onboard the satellite. The 200-kHz bandwidth contains four modulated carriers or subchannels spaced on 50-kHz centers, with modulation as defined in GMR-2 05.004 [7]. Each of the four subchannels is based on a time-multiplexed structure with 2 slots per frame as defined in clause 6.3.1, and with a burst rate as defined in GMR-2 05.001 [11].

The available frequency ranges for the forward and return links are defined in GMR-2 05.005 [8]. The forward channel center frequencies for the uplink and downlink are defined in GMR-2 05.005 [8]. The return channel center frequencies for the uplink and downlink are related to the forward channel center frequencies by fixed L-band and C-band duplex offsets, as provided in GMR-2 05.005 [8]. Within the return channel, the relationship between the return channel center frequency and the frequencies of its four subchannels is provided in GMR-2 05.005 [8], as well.

6.3 Timeslots and TDMA Frames

6.3.1 General

A timeslot in the forward link, or a forward slot period (FSP), shall have a duration of 3/5 200 seconds (≈577 µs). A bit in the forward link, or a forward bit period (FBP), shall have a duration of 48/13 µs (≈ 3,69 µs). A TDMA frame in the forward link shall consist of 8 time slots, corresponding to a frame period (FP) of 60/13 ms (≈ 4,62 ms).

A timeslot in the return link, or a return slot period (RSP), shall have a duration of 12/5 200 seconds (≈ 2,31 ms). A bit in the return link, or a return bit period (RBP), shall have a duration of 192/13 µs (≈ 14,77 µs). A TDMA frame on any of the four carriers in the return link shall consist of 2 time slots, corresponding to a frame period (FP) of 60/13 ms (≈ 4,62 ms), with stagger as shown in figure 9.0.3. Staggering of the frame boundaries of the four return carriers or subchannels is, as follows:

a) Subchannel 0 Frame Boundary is aligned with the return hyperframe epoch;

b) Subchannel 1 Frame Boundary is delayed by FSP;

c) Subchannel 2 Frame Boundary is delayed by 2 × FSP;

d) Subchannel 3 Frame Boundary is delayed by 3 × FSP.

These boundaries are also illustrated in figure 9.0.3.

System timing is derived from the master hyperframe epochs which repeat at a rate of one per hyperframe period, where a hyperframe period is defined in clause 6.3.3. The Network Control Center (NCC) maintains the master hyperframe clock with each Gateway having a local copy. Local copies are controlled by the Network Synchronization Subsystem such that epochs from all stations are aligned with the master epoch when referenced to the satellite.

Each allocated RF channel has individual Forward and Return hyperframe epochs. These hyperframe epochs are offset from the master hyperframe epoch by predetermined offsets which are referenced to the satellite. All subordinate frame structures are submultiples of the hyperframes, as indicated in clause 6.3.3.

The forward and return channels are offset differently in order to allow the same timeslot number to be used in the forward and return direction, without a requirement for the user terminal to transmit and receive simultaneously. Relative to the master hyperframe epoch, the epoch for a Forward RF channel is delayed by:

$n \times FSP + m \times SD$ sec

where n represents the Channel Offset (CO), m represents the Forward Stagger Group (FSG), and SD represents the stagger delay of 39 forward bit periods or 1 872/13 µsec. Relative to the master hyperframe epoch, the epoch for a Return RF channel is delayed by:

$n \times FSP$ sec

The determination of the forward/return epoch is described in more detail in GMR-2 05.010 [10].

Figure 9.0.4 illustrates an example of the forward/return timing offset convention.

6.3.2 Timeslot Number

The timeslots within a TDMA frame on the forward link shall be numbered from 0 to 7, as shown in figure 9.0.5

The timeslots within a TDMA frame on the return link shall be numbered from 0 to 7, with two slots on each of four return subchannels, as shown in figure 9.0.3. Note that the return subchannels are staggered from a return hyperframe epoch on the basis of forward slot periods (FSPs), as discussed in clause 6.3.1.

The timeslots shall be referred to by their timeslot number (TN).

6.3.3 TDMA Frame Number

TDMA frames on the forward and return links shall be numbered by a frame number (FN). The frame number shall be cyclic and shall have a range of 0 to FN_MAX where:

FN_MAX = (26 x 51 x 2 048) - 1 = 2 715 647

as defined in GMR-2 05.010 [10]. The frame number shall be incremented at the end of each TDMA frame.

The complete cycle of TDMA frame numbers from 0 to FN_MAX is defined as a hyperframe. A hyperframe consists of 2 048 superframes where a superframe is defined as 26 x 51 TDMA frames.

The multiframe is a structure which applies at the level of a TN group. Hence, different multiframe structures may exit on the same RF channel. There are two multiframe structures defined for the system:

1) A 26-TDMA-frame multiframe, referred to as a traffic multiframe, is used to support traffic, standalone dedicated control, and associated control channels. The duration of a traffic multiframe, or a traffic multiframe period (TMP), is 120 ms. With frames numbered from 0 to 25, frames 0 to 23 shall carry traffic or SDCCH bursts and frames 24 and 25 shall be reserved for S-SACCH bursts.

2) A 51-TDMA-frame multiframe, referred to as a control multiframe, is used to support broadcast and common control channels. The duration of a control multiframe, or a control multiframe period (CMP) is 3 060/13 ms (≈ 235 ms). Channels on the control multiframe repeat every two multiframes or 102 frames. The control multiframe epoch begins when [FN div 51] mod 2 = 0.

The need for a hyperframe of a substantially longer period than a superframe arises from the requirements of the encryption process which uses FN as an input parameter.

7 Physical Channels

7.1 General

A physical channel uses a combination of frequency and time division multiplexing and is defined as a sequence of radio frequency channels and timeslots. The complete definition of a particular physical channel consists of a description in the frequency domain, and a description in the time domain. The description in the frequency domain is addressed in clause 7.4, and the description in the time domain is addressed in clause 7.5.

7.2 Bursts

7.2.1 General

A burst is a period of RF carrier which is modulated by a data stream. A burst therefore represents the physical content of a timeslot. See figures 9.0.6a and 9.0.6b for burst formats.

7.2.2 Types of Burst and Burst Timing

A timeslot is divided into 156,25 bit periods, on both the forward and return links. A particular bit period within a timeslot is referenced by a bit number (BN), with the first bit period being numbered 0, and the last (1/4) bit period being numbered 156. In the clauses following the transmission timing of a burst within a timeslot is defined in terms of bit number. The bit with the lowest bit number is transmitted first.

Different types of bursts exist in the system. One characteristic of a burst is its useful duration. In the following clauses, the present document defines four bursts of 147 bits useful duration, with bit zero not counted. The useful part of a burst is defined as beginning from half way through bit number 0. The definition of the useful part of a burst needs to be considered in conjunction with the requirements placed on the phase and amplitude characteristics of a burst as specified in GMR-2 05.004 [7] and GMR-2 05.005 [8]. Figures 9.0.6a and 9.0.6b shows the burst formats. The burst format for the Frequency and Time Correction burst (FTCB) is the same as the format for the high margin M-sequence burst.

The period between bursts appearing in successive timeslots is termed the guard period. Clause 7.2.8 details constraints which relate to the guard period.

7.2.3 Normal Burst (NB)

Definition of the bit fields and contents of the normal burst are given in tables 7.2.1 and 7.2.2.

Table 7.2.1: Normal Burst Bit Field Definitions and Contents

Bit Number (BN)	Length of Field	Contents of Field	Definition
0 - 2	3	tail bits	table 7.2.2
3 - 62	60	encrypted bits (e0..e59)	GMR-2 05.003 [6]
63 - 84	22	training sequence bits	table 7.2.3
85 - 144	60	encrypted bits (e60..e119)	GMR-2 05.003 [6]
145 - 147	3	tail bits	table 7.2.2
148 - 156	8,25	guard periods (bits)	clause 7.2.8

Table 7.2.2: Normal Burst Tail Bit Field Definitions and Contents

Contents of field (BN ID numbers)	Bit definition
tail bits (BN0, BN1, BN2)	(0, 0, 0)
tail bits (BN145, BN146, BN147)	(0, 0, 0)

The training sequence bits are defined as modulating bits and given in table 7.2.3 according to the training sequence code (TSC). For broadcast, common control, and random access channels, the TSC must be based on the Beam Cluster Colour Code (BCCC) portion of the Spotbeam Identity Code (SBIC), described in clause 5.3.2.2 of the present document and as shown in table 7.2.3.

Table 7.2.3: Training Sequence Bit Field Contents

BCCC	Training Sequence Code	Training sequence bits (for bit ID numbers BN63 through BN84)
000	0	(1, 0, 0, 1, 0, 1, 1, 1, 0, 0, 0, 0, 1, 0, 0, 0, 1, 0, 0, 1, 0, 1)
001	1	(1, 0, 1, 1, 0, 1, 1, 1, 0, 1, 1, 1, 1, 0, 0, 0, 1, 0, 1, 1, 0, 1)
010	2	(0, 0, 0, 0, 1, 1, 1, 0, 1, 1, 1, 0, 1, 0, 0, 1, 0, 0, 0, 0, 1, 1)
011	3	(0, 0, 0, 1, 1, 1, 1, 0, 1, 1, 0, 1, 0, 0, 0, 1, 0, 0, 0, 1, 1, 1)
100	4	(0, 1, 1, 0, 1, 0, 1, 1, 1, 0, 0, 1, 0, 0, 0, 0, 0, 1, 1, 0, 1, 0)
101	5	(0, 0, 1, 1, 1, 0, 1, 0, 1, 1, 0, 0, 0, 0, 0, 1, 0, 0, 1, 1, 1, 0)
110	6	(1, 0, 0, 1, 1, 1, 1, 1, 0, 1, 1, 0, 0, 0, 1, 0, 1, 0, 0, 1, 1, 1)
111	7	(1, 0, 1, 1, 1, 1, 0, 0, 0, 1, 0, 0, 1, 0, 1, 1, 1, 0, 1, 1, 1, 1)

Under certain circumstances (e.g., DTX operation), only half of the encrypted bits present in a normal burst will contain useful information. In such cases the binary state of the remaining bits is not specified.

7.2.4 Frequency correction burst (FB)

Refer to clause 7.2.12.

7.2.5 Synchronization Burst (SB)

Definition of the synchronization burst by bit fields is given in tables 7.2.4 and 7.2.5.

Table 7.2.4: Synchronization Burst Bit Field Definitions and Contents

Bit Number (BN)	Length of field	Contents of field	Definition
0 - 2	3	tail bits	table 5.3.5
3 - 41	39	encoded bits (en0...en38)	GMR-2 05.003 [6]
42 - 105	64	extended training sequence bits	table 5.3.5
106 - 144	39	encoded bits (en39...en77)	GMR-2 05.003 [6]
145 - 147	3	tail bits	table 5.3.5
148 - 156	8,25	guard period (bits)	clause 7.2.8

Table 7.2.5: Tail Bit and Training Sequence Bit Field Contents

Contents of field (BN ID numbers)	Bit definition
tail bits (BN0, BN1, BN2)	(0, 0, 0)
extended training sequence bits (BN42, BN43 ... BN105)	(1, 0, 1, 1, 1, 0, 0, 1, 0, 1, 1, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 1, 1, 1, 1, 0, 0, 1, 0, 1, 1, 0, 1, 0, 1, 0, 0, 0, 1, 0, 1, 0, 1, 1, 1, 0, 1, 1, 0, 0, 0, 0, 1, 1, 0, 1, 1)
tail bits (BN145, BN146, BN147)	(0, 0, 0)

7.2.6 Dummy burst

Not used in GMR-2 system.

7.2.7 Access Burst (AB)

The access burst is shown in figure 9.0.6b. It is actually composed of two consecutive bursts with an extended guard period. The first burst is a Frequency and Time Correction burst as described in clause 7.2.12 (with only an 8 symbol guard period that may include guard bits); the second burst is a Normal Burst as described in clause 7.2.3. The contents and bit fields are given in the table 7.2.6. Unlike the other burst formats, the access burst is designed to extend across either 2, 3, 4, 5, 6, 7, 8, or 9 return frame periods based on the S-RACH configuration identified in the S-BCCH (see clause 5.3.2.3). This extension across 2, 3, 4, 5, 6, 7, 8, or 9 frame periods is achieved by accordingly extending the guard period, as indicated below. The extension is needed to accommodate the delay variation of users across a spotbeam. Note that the contents of the data contents of the S-RACH channel are placed on the "encrypted bits" portions of the Normal Burst per clause 7.2.3. Also note that the TSC is based on the BCCC portion of the SBIC per clause 7.2.3.

Table 7.2.6: Access Burst Bit Field Definitions and Contents

Bit Number (BN)	Length of field	Contents of field	Definition
0 - 156	156	FTCB Burst (w/8 symbol guard period) (Note)	clause 7.2.12
157 - 313	156,25	Normal Burst	clause 7.2.3
314 - 526	312,5	extended guard period (2 - frame mode)	clause 7.2.8
314 - 938	625,0	extended guard period (3 - frame mode)	
314 - 1 251	937,5	extended guard period (4 - frame mode)	
314 - 1 563	1 250,0	extended guard period (5 - frame mode)	
314 - 1 875	1 562,5	extended guard period (6 - frame mode)	
314 - 2 188	1 875,0	extended guard period (7 - frame mode)	
314 - 2 501	2 187,5	extended guard period (8 - frame mode)	
314 - 2 813	2 500,0	extended guard period (9 - frame mode)	
NOTE: May include guard bits.			

7.2.8 Guard Period

The guard period is provided because it is required for the Mobile Earth Stations (MESs) that transmission be attenuated for the period between bursts with the necessary ramp up and down occurring during the guard periods as defined in GMR-2 05.005 [8]. Each Gateway and NCC is required to ramp down and up between adjacent bursts. Ramping is performed between bursts because carriers are shared between Gateways and NCC, because some slots are unused, and because timeslot separation in the TDMA processor of the satellite digital channelizer occurs after ramp down. Guard period details are defined in GMR-2 05.005 [8]. In any case where the amplitude of transmission is ramped up and down, applying an appropriate modulation bit stream minimizes interference to other RF channels. For the access burst, however, the guard is additionally used to accommodate the delay variation of users across a spotbeam.

7.2.9 Satellite High Margin Burst (HB)

The satellite high margin burst is illustrated in figure 9.0.6a. It is used for the S-HPACH, the S-HBCCH and the S-BBCH. Tables 7.2.9 and 7.2.10 describe frame structure and bit definition.

Table 7.2.7: High Margin Burst Bit Field Definitions and Contents

Bit Number (BN)	Length of Field	Contents of Field	Definition
0 - 2	3	tail bits	table 7.2.8
3 - 66	64	encoded bits (en0...en63)	GMR-2 05.003 [6]
67 - 80	14	midamble bits	table 7.2.8
85 - 144	64	encoded bits (en64...en127)	GMR-2 05.003 [6]
145 - 147	3	tail bits	table 7.2.8
148 - 156	8,25	guard periods (bits)	clause 7.2.8

Table 7.2.8: Tail Bit and Midamble Bit Field Contents

Contents of field (BN ID numbers)	Bit definition
tail bits (BN0, BN1, BN2)	(0, 0, 0)
midamble bits (BN67 to BN80)	(x, x, x, x, x, x, x, x, x, x, x, x, x, x) (see below)
tail bits (BN145, BN146, BN147)	(0, 0, 0)

The 14 midamble bits of the HM burst may be used as an optional capability to send a slowly changing system-wide information message referred to as a Satellite Beam Broadcast Channel (S-BBCH), in which the message is coded as described in GMR-2 05.003 [6]. If the midamble bits are not being used to provided this optional capability, they shall be set as follows:

BN67 to BN80 = [1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0]

7.2.10 Satellite High Margin M-Sequence Burst (HMB)

The satellite high margin M-sequence burst is illustrated in figure 9.0.6a. It is used for the S-HMSCH and the S-HBCCH. Tables 7.2.9 and 7.2.10 describe frame structure and bit definition.

Table 7.2.9: High Margin M-Sequence Burst Bit Field Definitions and Contents

Bit Number (BN)	Length of Field	Contents of Field	Definition
0 - 2	3	tail bits	table 7.2.10
3 - 144	142	M-sequence bits	table 7.2.10
145 - 147	3	tail bits	table 7.2.10
148 - 156	8,25	guard periods (bits)	clause 7.2.8

Table 7.2.10: Tail Bit and M-Sequence Bit Field Contents

Contents of field (BN ID numbers)	Bit definition
tail bits (BN0, BN1, BN2)	(0, 0, 0)
M-sequence bits (BN3 to BN144)	(1, 1, 1, 0, 0, 0, 0, 0, 1, 1, 0, 0, 0, 1, 0, 1, 0, 1, 1, 0, 0, 1, 1, 0, 0, 1, 0, 1, 1, 1, 1, 1, 1, 0, 1, 1, 1, 1, 0, 0, 1, 1, 0, 1, 1, 1, 0, 1, 1, 1, 0, 0, 1, 0, 1, 0, 1, 0, 0, 1, 0, 1, 0, 0, 0, 1, 0, 0, 1, 0, 1, 1, 0, 1, 0, 0, 0, 1, 1, 0, 0, 1, 1, 1, 0, 0, 1, 1, 1, 1, 0, 0, 0, 1, 1, 0, 1, 1, 0, 0, 0, 0, 1, 0, 0, 0, 1, 0, 1, 1, 1, 0, 1, 0, 1, 1, 1, 1, 0, 1, 1, 0, 1, 1, 1, 1, 1, 0, 0, 0, 0, 1, 1, 0, 1, 0, 0, 1, 1, 0, 1, 0)
tail bits (BN145, BN146, BN147)	(1, 0, 0)

7.2.11 (No GSM equivalent clause)

Clause reserved for future use.

Table 7.2.11. (Reserved for future use)

Table 7.2.12. (Reserved for future use)

7.2.12 Frequency and Time Correction Burst (FTCB)

The Frequency and Time Correction burst is illustrated in figure 9.0.6b. The transmission of these bursts shall adhere to the following rules:

a) These special bursts shall be sent in a block of 4 at a time;

b) These bursts shall be mapped onto consecutive blocks of the traffic channel per table 9.

Tables 7.2.13 and 7.2.14 describe the frame structure and bit definition.

Table 7.2.13. Frequency and Time Correction Burst Bit Field Definitions and Contents

Table 7.2.13: Frequency and Time Correction Burst Bit Field Definitions and Contents

Bit Number (BN)	Length of Field	Contents of Field	Definition
0 - 2	3	tail bits	table 7.2.14
3 - 144	142	enhanced training sequence bits	table 7.2.14
145 - 147	3	tail bits	table 7.2.14
148 - 156	8,25	guard periods (bits)	clause 7.2.8

Table 7.2.14: Tail Bit and Training Sequence Bit Field Contents

Contents of field (BN ID numbers)	Bit definition
tail bits (BN0, BN1, BN2)	(0, 0, 0)
enhanced training sequence bits (BN3 to BN144)	(1, 1, 1, 0, 0, 0, 0, 0, 1, 1, 0, 0, 0, 1, 0, 1, 0, 1, 1, 0, 0, 1, 1, 0, 0, 1, 0, 1, 1, 1, 1, 1, 1, 0, 1, 1, 1, 1, 0, 0, 1, 1, 0, 1, 1, 1, 0, 1, 1, 1, 0, 0, 1, 0, 1, 0, 1, 0, 0, 1, 0, 1, 0, 0, 0, 1, 0, 0, 1, 0, 1, 1, 0, 1, 0, 0, 0, 1, 1, 0, 0, 1, 1, 1, 0, 0, 1, 1, 1, 1, 0, 0, 0, 1, 1, 0, 1, 1, 0, 0, 0, 0, 1, 0, 0, 0, 1, 0, 1, 1, 1, 0, 1, 0, 1, 1, 1, 1, 0, 1, 1, 0, 1, 1, 1, 1, 1, 0, 0, 0, 0, 1, 1, 0, 1, 0, 0, 1, 1, 0, 1, 0)
tail bits (BN145, BN146, BN147)	(1, 0, 0)

7.2.12.1 Gateway to MES Connection

The FTC burst block is transmitted by the gateway on the S-SDCCH after receiving an initial channel activation in response to a Layer 3 Channel Request message. The gateway shall continue to transmit the FTC burst block until a valid SABM message is received by the gateway. Once the gateway receives a valid SABM message, the gateway shall cease FTC transmission and send the UA using normal bursts. The MES shall transmit two FTC burst blocks prior to transmitting the initial SABM message to the gateway on the S-SDCCH. The MES shall repeat this procedure for each repeat of the initial SABM message.

7.2.12.2 Single Hop Mobile Earth Station Connection

The originating MES shall transmit FTC blocks on the S-TCH after the Connect Acknowledge message is transmitted to the gateway for the time duration as specified in M-MO timer in GMR-2 04.008 [5], HPA/HMS IEI, clause 11.5.2.47. The terminating MES shall transmit FTC blocks on the S-TCH after the Connect Acknowledge for the time duration as specified in M-MT timer in GMR-2 04.008 [5], HPA/HMS IEI, clause 11.5.2.47.

7.3 Physical Channels and Bursts

The description of a physical channel will be made in terms of timeslots and TDMA frames and not in terms of bursts. This is because there is not a one to one mapping between a particular physical channel, and the use of a particular burst.

7.4 Radio frequency channel sequence

Not used in GMR-2 system

7.5 Timeslot and TDMA Frame Sequence

A given physical channel shall always use the same timeslot number in every TDMA frame. A timeslot sequence is defined by:

a) a timeslot number (TN) group;

b) a bearer channel type;

c) a submultiplex index (SMI).

These items are related to:

1) a timeslot number (TN) group;

2) a frame number sequence (FN).

A TN group is defined as the resource consisting of the same number slot in a frame. There are 8 TN groups per forward RF channel numbered 0 through 7. There are 8 TN groups per return RF channel, 2 per subchannel.

Each TN group in an RF channel may be assigned for use as either a control channel or a traffic channel.

For traffic, a TN group can be submultiplexed to support one of four types of bearer channels: a full-rate channel, a half-rate channel, a quarter-rate channel, or an eighth- rate channel, as defined in clause 5.2.1. It is noted that the eighth-rate channel may also represent an S-SDCCH. One TN group for traffic may support any of the following traffic or S-SDCCH channels:

a) 1 S-TCH/F;

b) 2 S-TCH/H;

c) 4 S-TCH/Q;

d) 8 S-TCH/E or S-SDCCH;

A combination of the above.

The submultiplex index (SMI) indicates the particular frame number sequence used by the traffic channel. More information is provided in clause 9. The SMI for a full-rate channel is 0 (i.e., it repeats every frame). For a half-rate channel, it is either 0 or 1 (i.e., it repeats every 2 frames). For a quarter-rate channel, it is 0, 1, 2, or 3 (i.e., it repeats every 4 frames). For an eighth-rate channel, it is either 0, 1, 2, 3, 4, 5, 6, 7, or 8 (i.e., it repeats every 8 frames). For combinations of different rate traffic channels on the same TN group, table 7.5.1 illustrates which eighth-rate channels combine to form quarter-rate channels, which quarter-rate channels combine to form half-rate channels, and which half-rate channels combine to form a full-rate channel.

Table 7.5.1. Permissible Combinations of Channels

<table>
<tr><td rowspan="8">Full-Rate SMI = 0</td><td rowspan="4">Half-Rate SMI = 0</td><td rowspan="2">Quarter-Rate SMI = 0</td><td>Eighth-Rate SMI = 0</td></tr>
<tr><td>Eighth-Rate SMI = 4</td></tr>
<tr><td rowspan="2">Quarter-Rate SMI = 2</td><td>Eighth-Rate SMI = 2</td></tr>
<tr><td>Eighth-Rate SMI = 6</td></tr>
<tr><td rowspan="4">Half-Rate SMI = 1</td><td rowspan="2">Quarter-Rate SMI = 1</td><td>Eighth-Rate SMI = 1</td></tr>
<tr><td>Eighth-Rate SMI = 5</td></tr>
<tr><td rowspan="2">Quarter-Rate SMI = 3</td><td>Eighth-Rate SMI = 3</td></tr>
<tr><td>Eighth-Rate SMI = 7</td></tr>
</table>

For example, only one S-TCH/F may be assigned within a TN group. However, one S-TCH/H channel with SMI = 0 may be combined with one S-TCH/Q with SMI = 3, and two S-TCH/E or S-SDCCH/E channels with SMI = 1 and SMI = 5.

For control, TN groups are pre-assigned to include S-HMSCH, S-SCH, S-BCCH, S-HBCCH, S-PCH, S-AGCH, S-PCH/R, S-AGCH/R, and S-HPACH in the forward direction, and S-RACH in the return direction.

The TDMA frame number sequence represents the frame numbers within a multiframe which are needed to generate a traffic or control channel message. For traffic channels, the bearer channel type and the submultiplex index together define a particular FN sequence. For control, the pre-assigned TN groups define the frame number sequence. The physical channels defined by the TDMA frame number which can range from 0 to FN_MAX, as defined in clause 6.3.3, are called 'basic physical channels'.

The detailed definitions of TDMA TN groups, FN sequences, and SMIs for the different logical channels are given in clause 9. Figures 9.0.1 and 9.0.2 illustrate the basic timeslot/frame sequence configuration for a traffic multiframe and a control multiframe.

7.6 Parameters for Channel Definition and Assignment

7.6.1 General

This clause describes the set of parameters necessary to describe fully the mapping of any logical channel onto a physical channel. These parameters may be divided into general parameters that are characteristic of a particular spotbeam, and specific parameters that are characteristic of a given physical channel.

7.6.2 General Parameters

The following parameter is characteristic of a particular spotbeam:

TDMA frame number (FN), which can be derived from the reduced TDMA frame number (RFN) which is in the form of T1 and T2 (see clause 5.3.2).

This parameter is broadcast in the S-SCH.

7.6.3 Specific Parameters

These parameters are characteristic of a particular physical channel in a spotbeam:

a) the training sequence code (TSC);

b) the timeslot number (TN) group;

c) the user terminal radio frequency channel allocation (i.e. MES L-Band Channel Index);

d) the type of logical channel (i.e., S-TCH/QBS, S-BCCH, S-TCH/H4,8, S-SACCH, etc.) which implies the bearer channel type;

e) the submultiplex index (SMI);

f) forward stagger group (FSG), as defined in GMR-2 05.010 [10];

g) channel offset (CO), an integer number of FSPs from 0 to 51 × 8 - 1, as defined in GMR-2 05.010 [10];

h) spotbeam number;

i) mobile-mobile connection indicator;

j) large beam indicator (see GMR-2 05.010 [10]).

The parameters d) and e) allow the determination of the FN sequence, as discussed in clause 7.5.

8 Mapping of Logical Channels onto Physical Channels

8.1 General

The detailed mapping of logical channels onto physical channels is defined in the following clauses. Clause 8.2 identifies parameters that aid in channel mapping. Clause 8.3 defines the mapping of the physical channel onto a TDMA frame number. Clause 8.4 lists the permitted channel combinations and clause 8.5 defines the operation of channels and channel combinations.

8.2 Mapping in Frequency of Logical Channels onto Physical Channels

8.2.1 General

The parameters used in the function which map TDMA frame numbers onto radio frequency channel are defined in clause 8.2.2.

8.2.2 Parameters

The following parameter is required in the mapping from TDMA frame number to radio frequency channel for a given assigned channel:

TDMA frame number (FN) in the form of T1 and T2 (see clause 5.3.2).

It is specific to one NCC or Gateway and is broadcast on the S-SCH.

8.2.3 Hopping sequence generation

Not used.

8.2.4 Specific cases

Not used.

8.2.5 Change in the frequency allocation of a base transceiver station

Not used.

8.3 Mapping in Time of Logical Channels onto Physical Channels

8.3.1 General

The mapping in time of logical channels is defined in tables 9.0.1 through 9.0.7, which also define the relationship of the air interface frames to the multiframe. Figure 9.0.7 summarizes the elements of physical and logical channels that are mapped back and forth across the radio interface.

8.3.2 Key to the Mapping table of clause 9

The following relates to the Tables 9.0.1 through 9.0.7. The columns headed:

a) 'Channel designation' gives the precise acronym for the channel to which the mapping applies.

b) 'Sub-multiplex index' identifies the particular sub-multiplexing structure being defined where a basic physical channel supports more than one channel of this type.

c) 'Direction' defines whether the mapping given applies identically to forward link and return link (F & R), or to forward link (F) or return link (R) only.

d) 'Allowable timeslots assignments' defines whether the channel can be supported on, or assigned to, any of the timeslots, or only on specific timeslots.

e) 'Allowable RF channel assignments' defines whether the channel can use any of the radio frequency channels, or only the S-BCCH carrier (C0). It should be noted that any allocated channel Cx could be any radio frequency channel. It is also noted that allocated channel C0 for the S-BCCH need not have the lowest radio frequency channel number of the allocation.

f) 'Burst type' defines which type of burst as defined in clause 7.2 is to be used for the physical channel.

g) 'Repeat length in TDMA frames' defines how many TDMA frames occur before the mapping repeats itself. It is noted that the number before the slash refers to the repeat length before interleaving is incorporated; the number after the slash refers to the repeat length after interleaving is incorporated. For example, for S-TCH/Q2.4, the frame mapping repeats itself after one traffic multiframe or 26 frames prior to interleaving; however, with a 48-burst interleaver, the frame mapping repeats itself after 9 traffic multiframes or 234 frames.

h) 'Burst mapping by frame number' defines the TDMA frames used by each channel, before interleaving is considered.

i) 'Interleaved-block TDMA frame mapping' defines all possible sequences of frames over which a single encoded and interleaved traffic or control message block can be transmitted/ received over the 'repeat length'. As such, the numbers denoted in the sequence equate to the TDMA frame number modulo the TDMA 'repeat length'. These sequences incorporate the total number of frames to transmit and recover an entire interleaved message block. For example, a single S-TCH/QBS message block without interleaving can be transmitted over 1 frame, but the S-TCH/QBS interleaver spreads the message over 3 frames. Note that when diagonal interleaving is performed, TDMA frame numbers may be repeated between consecutive blocks.

8.3.3 Mapping of the TCH/F9,6,TCH/F4,8, TCH/H4,8 and TCH/H2,4

Not used

8.3.4 Mapping of S-BCCH Data

In order to facilitate the MES operation, it is necessary to transmit System Information messages on the S-BCCH. See GMR-2 04.008 [5], clause 4.2.2 for a discussion on the S-BCCH, S-HBCCH and system information messages.

Table 8.3.1 specifies the order in which system information messages shall be transmitted on the S-BCCH. TC represents the relative frame number: TC = (FN DIV 102) mod (8). TC is calculated and used by MESs to determine the relative place in a sequence of system information messages.

Table 8.3.1: System Information Message Mapping

TC	System Information Messages	
	S-BCCH Norm	S-BCCH Ext
0	Type 2	Type 8
1	Type 3	Type 8
2	Type 9	Type 8
3	Type 10	Type 8
4	Type 2	Type 8
5	Type 3	Type 8
6	Type 9	Type 8
7	Type 10	Type 7

1) See clause 8.5.1 for S-BCCH Ext resource sharing with S-AGCH and S-PCH

2) The definitions of S-BCCH Norm and S-BCCH Ext are given in the tables 9.0.1 through 9.0.7.

3) The parameter SB_BCCHext_Res is used to indicate the transmitted configuration of the S-BCCH_ext.

All the allowable timeslot assignments in a frame (see tables 9.0.1 through 9.0.7) shall contain the same information.

The use of the S-HBCCH and the use of the S-BCCH_ext for System Information messages are defined in GMR-2 04 .008 [5].

8.3.5 Mapping of SID Frames

When the DTX mode of operation is active, it is required to transmit Silence Descriptor (SID) information, or equivalent dummy information, during the SACCH/T block period. As the SID frames do not constitute a logical channel and their use is specific to DTX operation, the mapping of SID frames onto the TDMA frames is specified in GMR-2 05.008 [9].

8.4 Permitted Channel Combinations

Table 8.4.1 lists the permitted combinations, as defined by GMR-2 04.003 [3], in which channels can be accommodated onto basic physical channels. Numbers appearing in parenthesis after channel designations indicate the submultiplex index (SMI) for traffic channels. Refer to clause 7.5 for combinations of channels with different SMIs. Also, note that all channels need not necessarily be assigned:

Table 8.4.1: Permissible Channel Combinations

Signal Type	Multiframe Type	Permitted Channels
Traffic	Traffic	i) S-TCH/F + S-FACCH/F + S-SACCH/TF
Traffic	Traffic	ii) S-TCH/H(0, 1) + S-FACCH/H(0, 1) + S-SACCH/TH(0,1) (Note 2)
Traffic	Traffic	iii) S-TCH/HR(0, 1) + S-FACCH/HR(0, 1) + S-SACCH/THR(0,1) (Note 2)
Traffic	Traffic	iv) S-TCH/Q(0, 1, 2, 3) + S-FACCH/Q(0, 1, 2, 3) + S-SACCH/TQ(0, 1, 2, 3) (Note 2)
Traffic	Traffic	v) S-TCH/E(0, ..., 7) + S-FACCH/E(0, ..., 7) + S-SACCH/TE(0, ..., 7) (Note 2)
Control	Traffic	vi) S-SDCCH/E(0, ..., 7) + S-SACCH/CE(0, ..., 7) (Note 2)
Control	Control	vii) S-SCH + S-BCCH + S-CCCH (Note 1) + S-HMSCH + S-HBCCH
Control	Control	viii) S-BCCH Ext + S-CCCH (Note 1)
Control	Traffic	ix) S-SDCCH/Q(0, ..., 7) + S-SACCH/CQ(0, ..., 7) (Note 2)
Control	Traffic	x) S-SDCCH/HR(0,...,7) + S-SACCH/CHR(0, ..., 7) (Note 2)
NOTE 1: CCCH includes S-PCH, S-AGCH, S-RACH, S-PCH/R, S-AGCH/R, and S-HPACH. NOTE 2: For combinations involving, S-TCH/H, S-TCH/Q, S-TCH/E, S-SDCCH/E, S-SDCCH/Q, and S-SDCCH/HR, see clause 5.5.		

8.5 Operation of Channels and Channel Combinations

8.5.1 General

a) Timeslot number 0 of radio frequency channel C0 of the spotbeam allocation must support channel combination vii in clause 8.4. No other timeslot or allocated channel from the spotbeam allocation is allowed to support channel combination vii in clause 8.4.

b) The parameter SB_CC_CHANS in the S-BCCH defines the number of basic physical channels supporting common control channels (S-CCCH's). All shall use timeslots on radio frequency channel C0 of the spotbeam allocation.

   The allowed TN for each S-CCCH is specified in clause 5.3.2.3. Each S-CCCH carries its own CCCH_GROUP of Mobile Earth Stations in idle mode. Mobile Earth Stations in a specific CCCH_GROUP will listen for paging messages and make random accesses only on the specific S-CCCH to which the CCCH_GROUP belongs. The method by which a Mobile Earth Station determines the CCCH_GROUP to which it belongs is defined in clause 8.5.2.

c) The S-PCH, S-AGCH and S-BCCH ext may share the same S-CCCH TDMA frame mapping (considered modulo 102) when combined onto a basic physical channel. When the S-BCCH ext is in use on TN 0, neither the S-PCH or S-AGCH is allowed to use the S-BCCH ext blocks at any time. The S-PCH and S-AGCH channels are shared on a block-by-block basis, and the information within each block, when deinterleaved and decoded allows a Mobile Earth Station to determine whether the block contains paging messages, or access grants. However, to ensure a Mobile Earth Station satisfactory access to the system, a variable number of the available blocks in each 102 multiframe can be reserved for access grants. The number of blocks not used for paging (BS_AG_BLKS_RES) starting from, and including block number 0 is broadcast in the S-BCCH (see clause 5.3.2). As above the number of paging blocks per 102 TDMA frame multiframe considered to be 'available' shall be reduced by the number of blocks reserved for access grant messages. Table 9.0.6a and 9.0.6b define the access grant blocks and paging blocks available per 102 TDMA frame multiframe as a function of whether the S-BCCH ext is used.

   If system information messages are sent on S-BCCH Ext, SB_BCCHext_Res is set according to GMR-2 04.008 [5], clause 11.5.2.3.

When more than one TN is reserved for S-AGCH/S-PCH purposes, S-CCCH extensions are used (SB_CC_CHANS is set to 2, 3 or 4, table 5.3.3). The allowable extension TNs are as shown in table 5.3.4 and table 7.0.5a. S-AGCH/S-PCH blocks on the extension TN occupy the same frame numbers as S-AGCH/S-PCH blocks on TN_0 and the remaining frames on extension TNs are unoccupied, i.e., the S-BCCH, S-HMSCH, S-HBCCH and S-SCH are transmitted only on TN_0.

d) Another parameter in the S-BCCH, BS_PA_MFRMS indicates the number of 102 TDMA frame multiframes between transmissions of paging messages to Mobile Earth Stations of the same paging group. The 'available' paging blocks per S-PCH are then those 'available' per 102 TDMA frame multiframe on that S-PCH (determined by the two above parameters) multiplied by BS_PA_MFRMS. Mobile Earth Stations are normally only required to monitor every Nth block of their paging channel, where N equals the number of available blocks in total (determined by the above S-BCCH parameters) on the paging channel of the specific TN which their CCCH_GROUP is required to monitor. Other paging modes (e.g., page reorganize or paging overload conditions described in GMR-2 04.008 [5]) may require the Mobile Earth Station to monitor paging blocks more frequently than this. All the Mobile Earth Stations listening to a particular paging block are defined as being in the same PAGING_GROUP. The method by which a particular Mobile Earth Station determines to which particular PAGING_GROUP it belongs and hence which particular block of the available blocks on the paging channel is to be monitored is defined in clause 8.5.2.

8.5.2 Determination of CCCH_GROUP and PAGING_GROUP

CCCH_GROUP is determined from HPA_GROUP:

CCCH_GROUP (0...SB_CC_CHANS-1) = HPA_GROUP mod SB_CC_CHANS

where:

SB_CC_CHANS has a value 1 through 4.

PAGING_GROUP is determined from HPA_PAGING_GROUP:

PAGING_GROUP (0...Np - 1) = HPA_PAGING GROUP x (Np/Nh)

where:

N = number of paging blocks available in a 102 frame TDMA multiframe on one S-CCCH;

= (19 - BS_AG_BLKS_RES) when BCCHext is in use; or

= (21 - BS_AG_BLKS_RES) when BCCHext is not in use.

Np = number of paging blocks available on one S-CCCH;

= N x BS_PA_MFRMS.

Parameters BS_AG_BLKS_RES and BS_PA_MFRMS must be chosen so that Np is an integer multiple of Nh.

8.5.3 Determination of Specific Paging Multiframe and Paging Block Index

The required 102 TDMA frame multiframe occurs when:

PAGING_GROUP / N = (FN div 102) mod (BS_PA_MFRMS) for values of N > 0

The index to the required paging block of the available blocks in the 102 TDMA frame multiframe:

Paging block index = PAGING_GROUP mod N for values of N > 0

where the index is then used with the look-up tables (table 9.0.6a or table 9.0.6b) to determine the actual paging channel interleaved block to be monitored.

8.5.4 Short Message Service Cell Broadcast (SMSCB)

No currently supported. Clause reserved for future use.

8.5.5 Determination of HPA_GROUP and HPA_PAGING_GROUP

HPA_GROUP (0...M - 1) = [(IMSI mod 1 000) mod (M x Nh)] / Nh where '/' denotes truncating division.

HPA_PAGING_GROUP (0...Nh - 1) = [(IMSI mod 1 000) mod (M x No)] mod No where:

M is the number of Tens reserved for the S-HPACH, value 1 through 5, derived from the number of bits set to '1' in SB_HPA_EXT_RES.

And:

No is the number of HPA paging blocks on a single TN, value 5 or 8, derived from SB_HPA_BLKS_RES.

HPA_GROUPs 0 through M - 1 are assigned to Activated TNs in the order 4, 2, 3, 5, 6.

HPA_PAGING_GROUPS 0 through Nh - 1 are assigned to S-HPACH blocks in the order B0 - B(Nh - 1).

The bit map, SB_HPA_EXT_RES as defined in GMR-2 04.008 [5], table 11.5.2.27 determines which TN's are activated for S-HPACH channels.

IMSI = International Mobile Subscriber Identity, as defined in GMR-2 03.003 [2].

mod = Modulo.

8.5.6 Determination of S-RACH Subcarrier Frequency

The Mobile Earth Station shall use the subcarrier specified in System Information message Type 9 that is associated with its CCCH group as determined by clause 8.5.2 and clause 5.3.2.3.

9 Mapping tables

The mapping of logical to physical channels is shown in tables 9.0.1 through 9.0.7. Figures 9.0.1 through 9.0.7 are included following the tables.

Table 9.0.1: Mapping of Logical Channels onto Physical Channels for Speech Traffic (see clause 8.3, 8.4, 8.5)

Speech channel designation	Sub - Multiplex Index	Direction F(forward) R(return)	Allowable timeslot assignment	Allowable RF channel assignment	Burst type	Repeat length No. TDMA frames before/after interleaving	Burst mapping by frame no.	Interleaved block TDMA frame mapping
S-TCH/HES	0	F & R	0, ..., 7	C0...Cn	NB	26 / Reserved	0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22	(Reserved)
	1						1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	
S-TCH/HRS	0	F & R	0, ..., 7	C0...Cn	NB	26 / 26	0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22	B0(0, 2, 4, 6, 8, 10) B1(4, 6, 8, 10, 12, 14) B2(8, 10, 12, 14, 16, 18) B3(12, 14, 16, 18, 20, 22) B4(16, 18, 20, 22, 0, 2) B5(20, 22, 0, 2, 4, 6)
	1						1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	B0(1, 3, 5, 7, 9, 11) B1(5, 7, 9, 11, 13, 15) B2(9, 11, 13, 15, 17, 19) B3(13, 15, 17, 19, 21, 23) B4(17, 19, 21, 23, 1, 3) B5(21, 23, 1, 3, 5, 7)
S-TCH/QBS	0	F & R	0, ..., 7	C0...Cn	NB	26 / 26	0, 4, 8, 12, 16, 20	B0(0, 4, 8) B1(4, 8, 12) B2(8, 12, 16) B3(12, 16, 20) B4(16, 20, 0) B5(20, 0, 4)
	1						1, 5, 9, 13, 17, 21	B0(1, 5, 9) B1(5, 9, 13) B2(9, 13, 17) B3(13, 17, 21) B4(17, 21, 1) B5(21, 1, 5)
	2						2, 6, 10, 14, 18, 22	B0(2, 6,10) B1(6, 10, 14) B2(10, 14, 18) B3(14, 18, 22) B4(18, 22, 2) B5(22, 2, 6)

Speech channel designation	Sub - Multiplex Index	Direction F(forward) R(return)	Allowable timeslot assignment	Allowable RF channel assignment	Burst type	Repeat length No. TDMA frames before/after interleaving	Burst mapping by frame no.	Interleaved block TDMA frame mapping
	3						3, 7, 11, 15, 19,23	B0(3, 7, 11) B1(7, 11, 15) B2(11, 15, 19) B3(15, 19, 23) B4(19, 23, 3) B5(23, 3, 7)
S-TCH/ELS	0 1 2 3 4 5 6 7	F & R	0, ..., 7	C0...Cn	NB	26 / Reserved	0, 8, 16 1, 9, 17 2, 10, 18 3, 11, 19 4, 12, 20 5, 13, 21 6, 14, 22 7, 15, 23	(Reserved)

Table 9.0.2: Mapping of Logical Channels onto Physical Channels for Data Traffic (see clause 8.3, 8.4, 8.5)

Speech channel designation	Sub - Multiplex Index	Direction F(forward) R(return)	Allowable timeslot assignment	Allowable RF channel assignment	Burst type	Repeat length No. TDMA frames before/after interleaving	Burst mapping by frame no.	Interleaved block TDMA frame mapping
S-TCH/F9.6	0	F & R	0, ..., 7	C0...Cn	NB	26 / Reserved	0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23	(Reserved)
S-TCH/H4.8	0 1	F & R	0, ..., 7	C0...Cn	NB	26 / Reserved	0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	(Reserved)
S-TCH/HR2.4 (Not currently supported in GMR-2 system)	0	F & R	0, ..., 7	C0...Cn	NB	26 / 52	0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22	B0(0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44) B1(16, 18, 20, 22, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 0, 2, 4, 6, 8, 10) B2(34, 36, 38, 40, 42, 44, 46,48, 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 26, 28)
	1						1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	B0(1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 27, 29, 31, 33, 35, 57, 59, 41, 43, 45), B1(17, 19, 21, 23, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 47, 49, 1, 3, 5, 7, 9, 11) B2(35, 37, 39, 41, 43, 45, 57, 49, 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 27, 29)
S-TCH/Q2.4 (Baseline)	0	F & R	0, ..., 7	C0...Cn	NB	26 / 52	0, 4, 8, 12, 16, 20	B0(0, 4, 8, 12, 16, 20, 26, 30, 34, 38, 42) B1(16, 20, 26, 30, 34, 38, 42, 46, 0, 4, 8) B2(34, 38, 42, 46, 0, 4, 8, 12, 16, 20, 26)
	1						1, 5, 9, 13, 17, 21	B0(1, 5, 9, 13, 17, 21, 27, 31, 35, 39, 43) B1(17, 21, 27, 31, 35, 39, 43, 47, 1, 5, 7) B2(35, 39, 43, 47, 1, 5, 9, 13, 17, 21, 27)
	2						2, 6, 10, 14, 18, 22	B0(2, 6, 10, 14, 18, 22, 28, 32, 36, 40, 44) B1(18, 22, 28, 32, 36, 40, 44, 48, 2, 6, 10) B2(36, 40, 44, 48, 2, 6, 10, 14, 18, 22, 28)
	3						3, 7, 11, 15, 19, 23	B0(3, 7, 11, 15, 19, 23, 29, 33, 37, 41, 45) B1(19, 23, 29, 33, 37, 41, 45, 49, 3, 7, 11) B2(27, 41, 45, 49, 3, 7, 11, 15, 19, 23, 29)

Table 9.0.3: Mapping of Logical Channels onto Physical Channels for S-FACCH (see clauses 8.3, 8.4, 8.5)

Channel designation	Sub - Multiplex number	Direction F(forward) R(return)	Allowable timeslot assignment	Allowable RF channel assignment	Burst type	Repeat length No. TDMA frames before/after interleaving	Burst mapping by frame no.	Interleaved block TDMA frame mapping
S-FACCH/HES	0	F & R	0, ..., 7	C0...Cn	NB	26 / Reserved	0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22	(Reserved)
	1						1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	
S-FACCH/HRS	0	F & R	0, ..., 7	C0...Cn	NB	26 / 26	0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22	B0(0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22) B1(4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 0, 2) B2(8, 10, 12, 14, 16, 18, 20, 22, 0, 2, 4, 6) B3(12, 14, 16, 18, 20, 22, 0, 2, 4, 6, 8, 10) B4(16, 18, 20, 22, 0, 2, 4, 6, 8, 10, 12, 14) B5(20, 22, 0, 2, 4, 6, 8, 10, 12, 14, 16, 18)
	1						1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	B0(1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23) B1(5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 1, 3) B2(9, 11, 13, 15, 17, 19, 21, 23, 1, 3, 5, 7) B3(13, 15, 17, 19, 21, 23, 1, 3, 5, 7, 9, 11) B4(17, 19, 21, 23, 1, 3, 5, 7, 9, 11, 13, 15) B5(21, 23, 1, 3, 5, 7, 9, 11, 13, 15, 17, 19)
S-FACCH/QBS	0	F & R	0, ..., 7	C0...Cn	NB	26 / 26	0, 4, 8, 12, 16, 20	B0(0, 4, 8, 12, 16, 20) B1(4, 8, 12, 16, 20, 0) B2(8, 12, 16, 20, 0, 4) B3(12, 16, 20, 0, 4, 8) B4(16, 20, 0, 4, 8, 12) B5(20, 0, 4, 8, 12, 16)
	1						1, 5, 9, 13, 17, 21	B0(1, 5, 9, 13, 17, 21) B1(5, 9, 13, 17, 21, 1) B2(9, 13, 17, 21, 1, 5) B3(13, 17, 21, 1, 5, 9) B4(17, 21, 1, 5, 9, 13) B5(21, 1, 5, 9, 13, 17)
	2						2, 6, 10, 14, 18, 22	B0(2, 6, 10, 14, 18, 22) B1(6, 10, 14, 18, 22, 2), B2(10, 14, 18, 22, 2, 6) B3(14, 18, 22, 2, 6, 10), B4(18, 22, 2, 6, 10, 14) B5(22, 2, 6, 10, 14, 18)
	3						3, 7, 11, 15, 19, 23	B0(3, 7, 11, 15, 19, 23) B1(7, 11, 15, 19, 23, 3) B2(11, 15, 19, 23, 3, 7)

Channel designation	Sub - Multiplex number	Direction F(forward) R(return)	Allowable timeslot assignment	Allowable RF channel assignment	Burst type	Repeat length No. TDMA frames before/after interleaving	Burst mapping by frame no.	Interleaved block TDMA frame mapping
								B3(15, 19, 23, 3, 7, 11) B4(19, 23, 3, 7, 11, 15) B5(23, 3, 7, 11, 15, 19)
S-FACCH/ELS	0 1 2 3 4 5 6 7	F & R	0, ..., 7	C0...Cn	NB	26 / Reserved	0, 8, 16 1, 9, 17 2, 10, 18 3, 11, 19 4, 12, 20 5, 13, 21 6, 14, 22 7, 15, 23	(Reserved)
S-FACCH/F9.6	0	F & R	0, ..., 7	C0...Cn	NB	26 / Reserved	0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24	(Reserved)
S-FACCH/H4.8	0 1	F & R	0, ..., 7	C0...Cn	NB	26 / Reserved	0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	(Reserved)
S-FACCH/HR2.4 (Not supported in current GMR-2 system)	0 1	F & R	0, ..., 7	C0...Cn	NB	26 / 52	0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	B0(0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44) B1(16, 18, 20, 22, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 0, 2, 4, 6, 8, 10) B2(34, 36, 38, 40, 42, 44, 46, 48, 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 26, 28) B0(1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 27, 29, 31, 33, 35, 57, 59, 41, 43, 45) B1(17, 19, 21, 23, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 47, 49, 1, 3, 5, 7, 9, 11) B2(35, 37, 39, 41, 43, 45, 57, 49, 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 27, 29)

Channel designation	Sub - Multiplex number	Direction F(forward) R(return)	Allowable timeslot assignment	Allowable RF channel assignment	Burst type	Repeat length No. TDMA frames before/after interleaving	Burst mapping by frame no.	Interleaved block TDMA frame mapping
S-FACCH/ Q2.4	0	F & R	0, ..., 7	C0...Cn	NB	26 / 52	0, 4, 8, 12, 16, 20	B0(0, 4, 8, 12, 16, 20, 26, 30, 34, 38, 42) B1(16, 20, 26, 30, 34, 38, 42, 46, 0, 4, 8) B2(34, 38, 42, 46, 0, 4, 8, 12, 16, 20, 26)
	1						1, 5, 9, 13, 17, 21	B0(1, 5, 9, 13, 17, 21, 27, 31, 35, 39, 43) B1(17, 21, 27, 31, 35, 39, 43, 47, 1, 5, 7) B2(35, 39, 43, 47, 1, 5, 9, 13, 17, 21, 27)
	2						2, 6, 10, 14, 18, 22	B0(2, 6, 10, 14, 18, 22, 28, 32, 36, 40, 44) B1(18, 22, 28, 32, 36, 40, 44, 48, 2, 6, 10) B2(36, 40, 44, 48, 2, 6, 10, 14, 18, 22, 28)
	3						3, 7, 11, 15, 19, 23	B0(3, 7, 11, 15, 19, 23, 29, 33, 37, 41, 45) B1(19, 23, 29, 33, 37, 41, 45, 49, 3, 7, 11) B2(27, 41, 45, 49, 3, 7, 11, 15, 19, 23, 29)

Table 9.0.4: Mapping of Logical Channels onto Physical Channels for S-SACCH (See clauses 8.3, 8.4, 8.5)

Channel designation	Sub - Multiplex number	Direction F(forward) R(return)	Allowable timeslot assignment	Allowable RF channel assignment	Burst type	Repeat length No. TDMA frames before/after interleaving	Burst mapping by frame no.	Interleaved block TDMA frame mapping
S-SACCH/TF	0	F & R	0, ..., 7	C0...Cn	NB	26/104	24	B(24, 50, 76, 102)
S-SACCH/TH	0 1	F & R	0,...,7	C0...Cn	NB	26/104	24 25	B(24, 50, 76, 102) B(25, 51, 77, 103)
S-SACCH/THR	0 1	F & R	0, ..., 7	C0...Cn	NB	26/208	24 25	B(24, 50, 76, 102, 128, 154, 180, 206) B(25, 51, 77, 103, 129, 155, 181, 207)
S-SACCH/TQ	0 1 2 3	F & R	0, ..., 7	C0...Cn	NB	52/208	24 on K = 2k(Note 1) 25 on K = 2k 24 on K = 2k + 1 25 on K = 2k + 1	B(24, 76, 128, 180) B(25, 77, 129, 181) B(50, 102, 154, 206) B(51, 103, 155, 207)
S-SACCH/TE	0 1 2 3 4 5 6 7	F & R	0, ..., 7	C0...Cn	NB	104/416	24 on K = 4k (Note 2) 25 on K = 4k 24 on K = 4k + 1 25 on K = 4k + 1 24 on K = 4k + 2 25 on K = 4k + 2 24 on K = 4k + 3 25 on K = 4k + 3	B(24, 128, 232, 336) B(25, 129, 233, 337) B(50, 154, 258, 362) B(51, 155, 259, 363) B(76, 180, 284, 388) B(77, 181, 285, 389) B(102, 206, 310, 414) B(103, 207, 311, 415)
S-SACCH/CE	0 1 2 3 4 5 6 7	F & R	0, ..., 7	C0...Cn	NB	104/416	24 on K = 4k (Note 2) 25 on K = 4k 24 on K = 4k + 1 25 on K =4k + 1 24 on K = 4k + 2 25 on K = 4k + 2 24 on K = 4k + 3 25 on K = 4k + 3	B(24, 128, 232, 336) B(25, 129, 233, 337) B(50, 154, 258, 362) B(51, 155, 259, 363) B(76, 180, 284, 388) B(77, 181, 285, 389) B(102, 206, 310, 414) B(103, 207, 311, 415)
S-SACCH/CQ	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
S-SACCH/CHR	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
NOTE 1: K represents the traffic multiframe number where k = 0, 1 for S-SACCH/TQ. NOTE 2: K represents the traffic multiframe number where k = 0, 1, 2, 3 for S-SACCH/TE & S-SACCH/CE.								

Table 9.0.5a: Mapping of Logical Channels onto Physical Channels for S-AGCH, S-BCCH, S-HMSCH, S-HPACH, S-HBCCH, S-BBCH, and S-SCH (see clauses 8.3, 8.4, 8.5)

Channel designation	Direction F(forward) R(return)	Allowable timeslot assignment	Allowable RF channel assignment	Burst type	Repeat length No. TDMA frames before/after interleaving	Burst mapping by frame no.	Interleaved block TDMA frame mapping
S-SCH	F	0	C0	SB	102/--	1	N/A
S-HMSCH	F	0	C0	HMB	102/--	0	N/A
S-HBCCH (Note 3)	F	0	C0	HMB HB	2 754/2 754 2 754/2 754	22 61, 81, 124, 163, 183, 226, 265, 285, 2 674, 2 713, 2733	B0(22) B1(61, 81, 124, 163) B2(183, 226, 265,. . ., 2 713, 2 733)
S-HPACH (IMSI) (Note 2)	F	2, 3, 4, 5, 6	C0	HB	102/102	2 - 20 23 - 41 42 - 60 62 - 80 82 - 100	B0(2, 3, 4, 5) (Note 1), $B0_2$(6,. . ., 19, 20) B1(23, . . ., 26) (Note 1), $B1_2$(27, . . ., 41) B2(42, . . ., 45) (Note 1), $B2_2$(46, . . ., 60) B3(62, . . ., 65) (Note 1), $B3_2$(66, . . ., 80) B4(82, . . ., 85) (Note 1), $B4_2$(86, . . ., 100)
S-HPACH (TMSI) (Note 2) (Option, not supported by current GMR-2 system)	F	2, 3, 4, 5, 6	C0	HB	102/102	2 - 13 14 - 20, 23 - 27 28 - 39 40 - 51 52 - 60, 62 - 64 65 - 76 77 - 80, 82 - 89 90 - 101	B0(2, 3, 4, 5) (Note 1), B0(6, 7, ..., 13) (Note 2) B1(14, ..., 17 (Note 1)), B1(18, ..., 20, 23, ..., 27) (Note 2) B2(28, ..., 31) (Note 1), B2(32, 33, ..., 39) (Note 2) B3(40, ..., 43) (Note 1), B3(44, 45, ..., 51) (Note 2) B4(52, ..., 55) (Note 1), B4(56,..., 60, 62, ..., 64) (Note 2) B5(65, ..., 68) (Note 1),B5(69, 70, ..., 76) (Note 2) B6(77, ..., 80) (Note 1), B6(82, 83, ..., 89) (Note 2) B7(90, ..., 93) (Note 1), B7(94, 95, ..., 101) (Note 2)
S-BCCH Norm (Note 4)	F	0	C0	NB	102/102	2 - 5 and 52 - 55	B(2, 3, 4, 5) and B(52, 53, 54, 55)
S-BCCH ext (Note 4)	F	0	C0	NB	102/102	6 - 9 and 56 - 59	B(6, 7, 8, 9) and B(56, 57, 58, 59)
S-CCCH (Note 6) (S-AGCH/S-PCH) (S-PCH is not supported by the current GMR-2 system)	F	0, 1, 6, 7	C0	NB	102/102	6 - 9 10 - 13 14 - 17 18 - 21 23 - 26 27 - 30 31 - 34 35 - 38 39 - 42 43 - 46 47 - 50 56 - 59	B0(6, 7, 8, 9) (Note 7) B1(10, 11, 12, 13) B2(14, 15, 16, 17) B3(18, 19, 20, 21) B4(23, 24, 25, 26) B5(27, 28, 29, 30) B6(31, 32, 33, 34) B7(35, 36, 37, 38) B8(39, 40, 41, 42) B9(43, 44, 45, 46) B10(47, 48, 49, 50) B11(56, 57, 58, 59) (Note 7)

Channel designation	Direction F(forward) R(return)	Allowable timeslot assignment	Allowable RF channel assignment	Burst type	Repeat length No. TDMA frames before/after interleaving	Burst mapping by frame no.	Interleaved block TDMA frame mapping
						65 - 68 69 - 72 73 - 76 77 - 80 82 - 85 86 - 89 90 - 93 94 - 97 98 - 101	B12(65, 66, 67, 68) B13(69,70,71,72) B14(73,74,75,76) B15(77,78,79,80) B16(82,83,84,85) B17(86,87,88,89) B18(90,91,92,93) B19(94,95,96,97) B20(98,99,100,101)
S-AGCH/R	Reserved	Reserved	Reserved	R'svd	Reserved	Reserved	Reserved
S-BBCH (Option, but not in baseline)	F	0	C0	HB[5]	5 508/5 508	183, 226, 265, 285, . . ., 2 674, 2 713, 2 733, . . ., 5 283	B(183,226,265,285, . . ., 2674,2713, . . ., 5283)

NOTE 1: See clause 6.3.3 for definition of start of control multiframe epoch.
NOTE 2: IMSI/TMSI refers to an option as defined in S-BCCH (see figures 9.0.2a to 9.0.2d).
NOTE 3: The S-HBCCH and the S-BBCH are periodic structures which are aperiodic with the hyperframe structure.
NOTE 4: The same S-BCCH message is transmitted in each of the two noted TDMA blocks of the control multiframe.
NOTE 5: The S-BBCH is mapped onto the 14-bit midambles of the HB burst.
NOTE 6: The S-CCCH resource is divided between the S-PCH and S-AGCH logical functions as described in clause 8.5.1, item c.
NOTE 7: Blocks B0 and B11are used for S-BCCHext on TN_0 only, if this function is active.

Table 9.0.5b: Mapping of Logical Channels onto Physical Channels for S-SDCCH (see clauses 8.3, 8.4, 8.5)

Channel Designation	Sub - Multiplex number	Direction F(forward) R(return)	Allowable timeslot assignment	Allowable RF channel assignment	Burst type	Repeat length No. TDMA frames before/after interleaving	Burst mapping by frame no.	Interleaved block TDMA frame mapping
S-SDCCH/E	0	F & R	0, ..., 7	C0...Cn	NB	26/104	0, 8, 16	B0(0, 8, 16, 26) B1(34, 42, 52, 60) B2(68, 78, 86, 94)
	1						1, 9, 17	B0(1, 9, 17, 27) B1(35, 43, 53, 61) B2(69, 79, 87, 95)
	2						2, 10, 18	B0(2, 10, 18, 28) B1(36, 44, 54, 62) B2(70, 80, 88, 96)
	3						3, 11, 19	B0(3, 11, 19, 29) B1(37, 45, 55, 63) B2(71, 81, 89, 97)
	4						4, 12, 20	B0(4, 12, 20, 30) B1(38, 46, 56, 64) B2(72, 82, 90, 98)
	5						5, 13, 21	B0(5, 13, 21, 31) B1(39, 47, 57, 65) B2(73, 83, 91, 99)
	6						6, 14, 22	B0(6, 14, 22, 32) B1(40, 48, 58, 66) B2(74, 84, 92, 100)
	7						7, 15, 23	B0(7, 15, 23, 33) B1(41, 49, 59, 67) B2(75, 85, 93, 101)
S-SDCCH/Q	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
S-SDCCH/HR	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved

Table 9.0.5c: Mapping of Logical Channels onto Physical Channels for S-RACH (see clauses 8.3, 8.4, 8.5)

Channel designation	Direction F(forward) R(return)	Allowable timeslot assignment	Allowable RF channel assignment	Burst type	Repeat length No. TDMA frames before/after interleaving	Burst mapping by frame no.	Interleaved block TDMA frame mapping
S-RACH	R	0, 4 1, 5 2, 6 3, 7	C0	AB	102	2 3 4 5 6 7 8 9	B0(0, 1) B1(2, 3) B2(4, 5) B3(6, 7) B4(8, 9), . . ., Bx(2x, 2x + 1), . . ., B49(98, 99), …, B50(100, 101) B0(0, 1, 2) B1(3, 4, 5), B2(6, 7, 8), . . .,Bx(3x. 3x + 1,3x + 2), . ., B32(96, 97, 98), B33(99, 100, 101) B0(0, 1, 2, 3) B1(4, 5, 6, 7), . . ., Bx(4x, 4x + 1,4x + 2,4x + 3), . . ,B24(96, 97, 98, 99) B0(0, 1, 2, 3, 4) B1(5, 6, 7, 8, 9), . . ., Bx(5x, 5x + 1,5x + 2,5x + 3,5x + 4), …, B19(95, 96, 97, 98, 99) B0(0, 1, 2, 3, 4, 5) B1(6, 7, 8, 9, 10, 11), . . ., Bx(6x, 6x + 1,6x +2, . . ., 6x + 5), . . ., B16(96, 97, 98, 99, 100, 101) B0(0, 1, 2, 3, 4, 5, 6), B1(7, 8, 9, 10, 11, 12, 13), . . ., Bx(7x, 7x + 1,. . ., 7x + 6), . . ., B13(91, 92, 93, 94, 95, 96, 97) B0(0, 1, 2, 3, 4, 5, 6, 7) B1(8, 9, 10, 11, 12, 13, 14, 15), . . ., Bx(8x, 8x + 1, . . ., 8x + 7), . . ., B11(88, 89, 90, 91, 92, 93, 94, 95) B0(0, 1, 2, 3, 4, 5, 6, 7, 8) B1(9, 10, 11, 12, 13, 14, 15, 16, 17), . . ., Bx(9x, 9x + 1, . . .,9x + 8), . ., B10(90, 91, 92, 93, 94, 95, 96, 97, 98)
NOTE: All of these lengths are valid for each allowable timeslot combination.							

Table 9.0.6a: Blocks Assigned to S-AGCH and S-PCH logical functions, when S-BCCHext is not in use (i.e., the parameter SB_BCCHext_Res is set to 00)

Value of the parameter BS_AG_BLKS_RES	Blocks Assigned to the S-AGCH Logical Function	Blocks Assigned to the S-PCH Logical Function
0	None	B0 thru B20
1	B0	B1 thru B20
2	B0, B1	B2 thru B20
3	B0 thru B2	B3 thru B20
4	B0 thru B3	B4 thru B20
5	B0 thru B4	B5 thru B20
6	B0 thru B5	B6 thru B20
7	B0 thru B6	B7 thru B20
8	B0 thru B7	B8 thru B20
9	B0 thru B8	B9 thru B20
10	B0 thru B9	B10 thru B20
11	B0 thru B10	B11 thru B20
12	B0 thru B11	B12 thru B20
13	B0 thru B12	B13 thru B20
14	B0 thru B13	B14 thru B20
15	B0 thru B14	B15 thru B20
16	B0 thru B15	B16 thru B20
17	B0 thru B16	B17 thru B20
18	B0 thru B17	B18 thru B20
19	B0 thru B18	B19, B20
20	B0 thru B19	B20
21	B0 thru B20	None

Table 9.0.6b: Blocks Assigned to S-AGCH and S-PCH logical functions, when S-BCCHext is in use (i.e., the parameter SB_BCCHext_Res is not set to 00)

Value of the parameter BS_AG_BLKS_RES	Blocks Assigned to the S-AGCH Logical Function	Blocks Assigned to the S-PCH Logical Function
0	None	B1 thru B10, B12 thru B20
1	B1	B2 thru B10, B12 thru B20
2	B1, B2	B3 thru B10, B12 thru B20
3	B1 thru B3	B4 thru B10, B12 thru B20
4	B1 thru B4	B5 thru B10, B12 thru B20
5	B1 thru B5	B6 thru B10, B12 thru B20
6	B1 thru B6	B7 thru B10, B12 thru B20
7	B1 thru B7	B8 thru B10, B12 thru B20
8	B1 thru B8	B9, B10, B12 thru B20
9	B1 thru B9	B10, B12 thru B20
10	B1 thru B10	B12 thru B20
11	B1 thru B10, B12	B13 thru B20
12	B1 thru B10, B12, B13	B14 thru B20
13	B1 thru B10, B12 thru B14	B15 thru B20
14	B1 thru B10, B12 thru B15	B16 thru B20
15	B1 thru B10, B12 thru B16	B17 thru B20
16	B1 thru B10, B12 thru B17	B18 thru B20
17	B1 thru B10, B12 thru B18	B19, B20
18	B1 thru B10, B12 thru B19	B20
19	B1 thru B10, B12 thru B20	None
NOTE: Blocks B0 and B11 are assigned to the S-BCCHext logical function, and are not used for S-AGCH or S-PCH functions.		

Table 9.0.7a: Mapping of FTC Bursts onto S-SDCCH Channel for Forward/Return Link

Logical Channel Designation for FTCB	Sub - Multiplex number	Allowable timeslot assignment	Allowable RF channel assignment	Burst type	Repeat length No. TDMA frames before/after interleaving	Burst mapping by frame no.	Interleaved block TDMA frame mapping
S-SDCCH/E	0	0, ..., 7	C0...Cn	FTCB (Note)	26 / 104	0, 8, 16	B0(0, 8, 16, 26) B1(34, 42, 52, 60) B2(68, 78, 86, 94)
	1					1, 9, 17	B0(1, 9, 17, 27) B1(35, 43, 53, 61) B2(69, 79, 87, 95)
	2					2, 10, 18	B0(2, 10, 18, 28) B1(36, 44, 54, 62) B2(70, 80, 88, 96)
	3					3, 11, 19	B0(3, 11, 19, 29) B1(37, 45, 55, 63) B2(71, 81, 89, 97)
	4					4, 12, 20	B0(4, 12, 20, 30) B1(38, 46, 56, 64) B2(72, 82, 90, 98)
	5					5, 13, 21	B0(5, 13, 21, 31) B1(39, 47, 57, 65) B2(73, 83, 91, 99)
	6					6, 14, 22	B0(6, 14, 22, 32) B1(40, 48, 58, 66) B2(74, 84, 92, 100)
	7					7, 15, 23	B0(7, 15, 23, 33) B1(41, 49, 59, 67) B2(75, 85, 93, 101)
S-SDCCH/Q	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
S-SDCCH/HR	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
NOTE: See clause 7.2.12 and 7.2.12.1 of the present document for usage of FTCB with S-SDCCH mapping.							

Table 9.0.7b: Mapping of FTC Bursts onto S-TCH Channels for MES-to-MES Single Hop Connection

Logical Channel Designation for FTCB	Sub - Multiplex number	Allowable timeslot assignment	Allowable RF channel assignment	Burst type	Repeat length No. TDMA frames before/after interleaving	Burst mapping by frame no.	Interleaved block TDMA frame mapping
S-TCH/F	0	0, ..., 7	C0...Cn	FTCB (Note)	26 / Reserved	0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24	(Reserved)
S-TCH/H	0	0, ..., 7	C0...Cn	FTCB (Note)	26 / 26	0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22	B0(0, 2, 4, 6), B1(4, 6, 8, 10) B2(8, 10, 12, 14) B3(12, 14, 16, 18) B4(16, 18, 20, 22), B5(20, 22, 0, 2)
	1					1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	B0(1, 3, 5, 7) B1(5, 7, 9, 11) B2(9, 11, 13, 15) B3(13, 15, 17, 19) B4(17, 19, 21, 23) B5(21, 23, 1, 3)
S-TCH/Q	0	0, ..., 7	C0...Cn	FTCB (Note)	26 / 26	0, 4, 8, 12, 16, 20	B0(0, 4, 8, 12) B1(4, 8, 12, 16) B2(8, 12, 16, 20) B3(12, 16, 20, 0) B4(16, 20, 0, 4) B5(20, 0, 4, 8)
	1					1, 5, 9, 13, 17, 21	B0(1, 5, 9, 13), B1(5, 9, 13, 17), B2(9, 13, 17, 21), B3(13, 17, 21, 1), B4(17, 21, 1, 5), B5(21, 1, 5, 9)
	2					2, 6, 10, 14, 18, 22	B0(2, 6, 10, 14), B1(6, 10, 14, 18), B2(10, 14, 18, 22), B3(14, 18, 22, 2), B4(18, 22, 2,6, B5(22, 2, 6, 10)
	3					3, 7, 11, 15, 19, 23	B0(3, 7, 11, 15), B1(7, 11, 15, 19), B2(11, 15, 19, 23), B3(15, 19, 23, 3), B4(19, 23, 3, 7), B5(23, 3, 7, 11)
S-TCH/E	0 1 2 3 4 5 6 7	0, ..., 7	C0...Cn	FTCB (Note)	26 / Reserved	0, 8, 16 1, 9, 17 2, 10, 18 3, 11, 19 4, 12, 20 5, 13, 21 6, 14, 22 7, 15, 23	(Reserved)

NOTE: See clause 7.2.12 and 7.2.12.2 of the present document for usage of FTCB with S-TCH mapping.

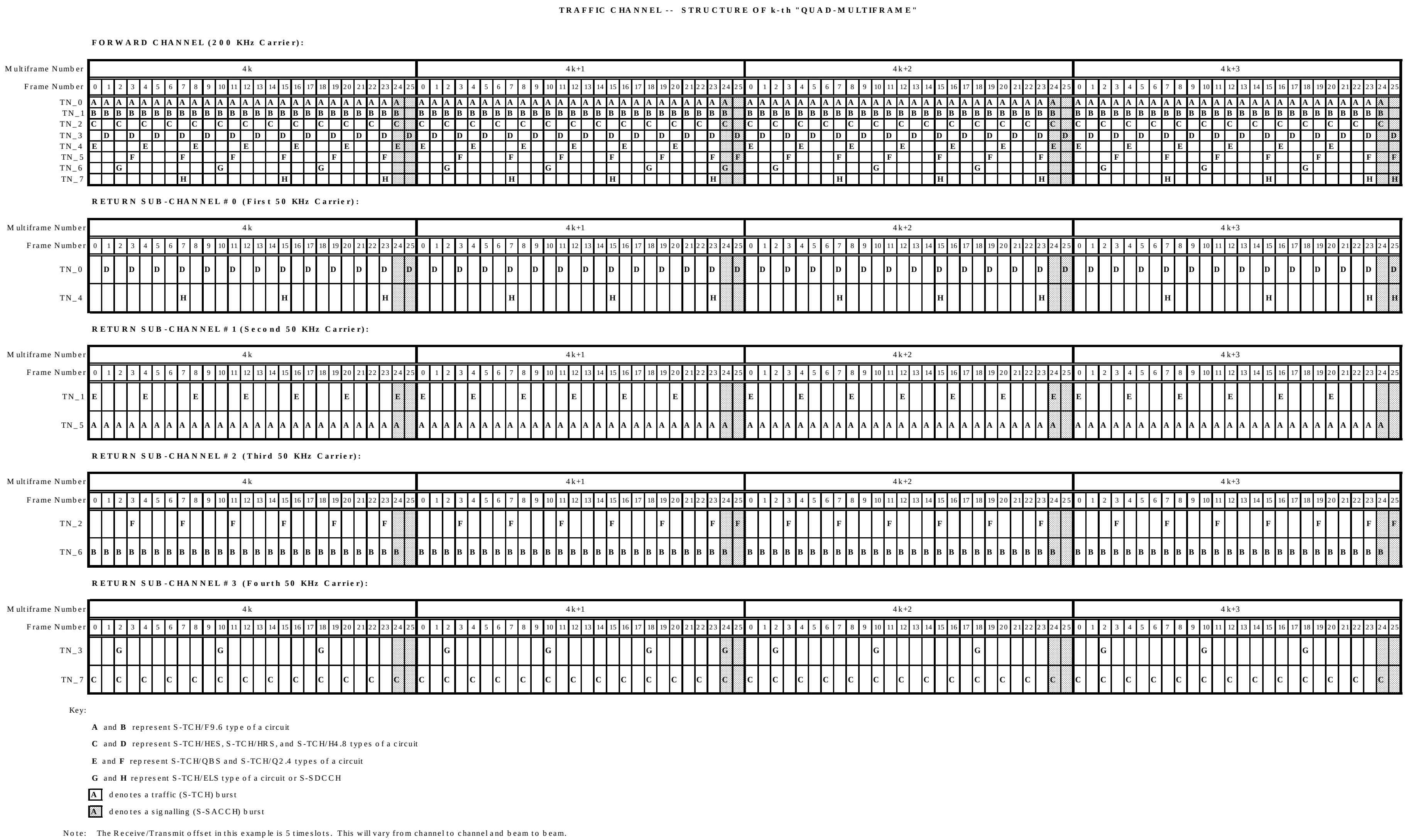

Figure 9.0.1: TDMA Frame Mapping for Traffic Channels

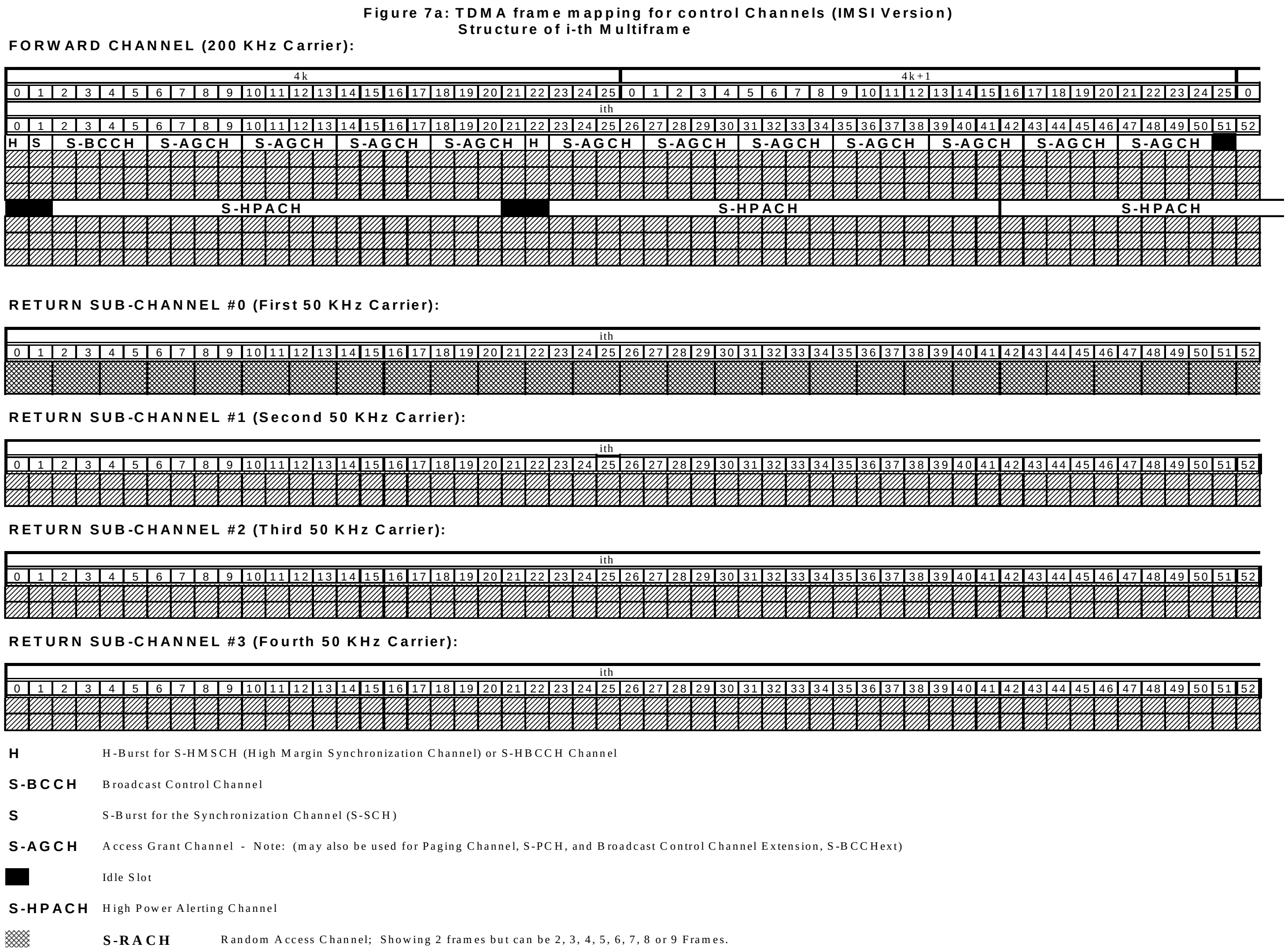

Figure 9.0.2a: TDMA Frame Mapping for Control Channels (IMSI Version)

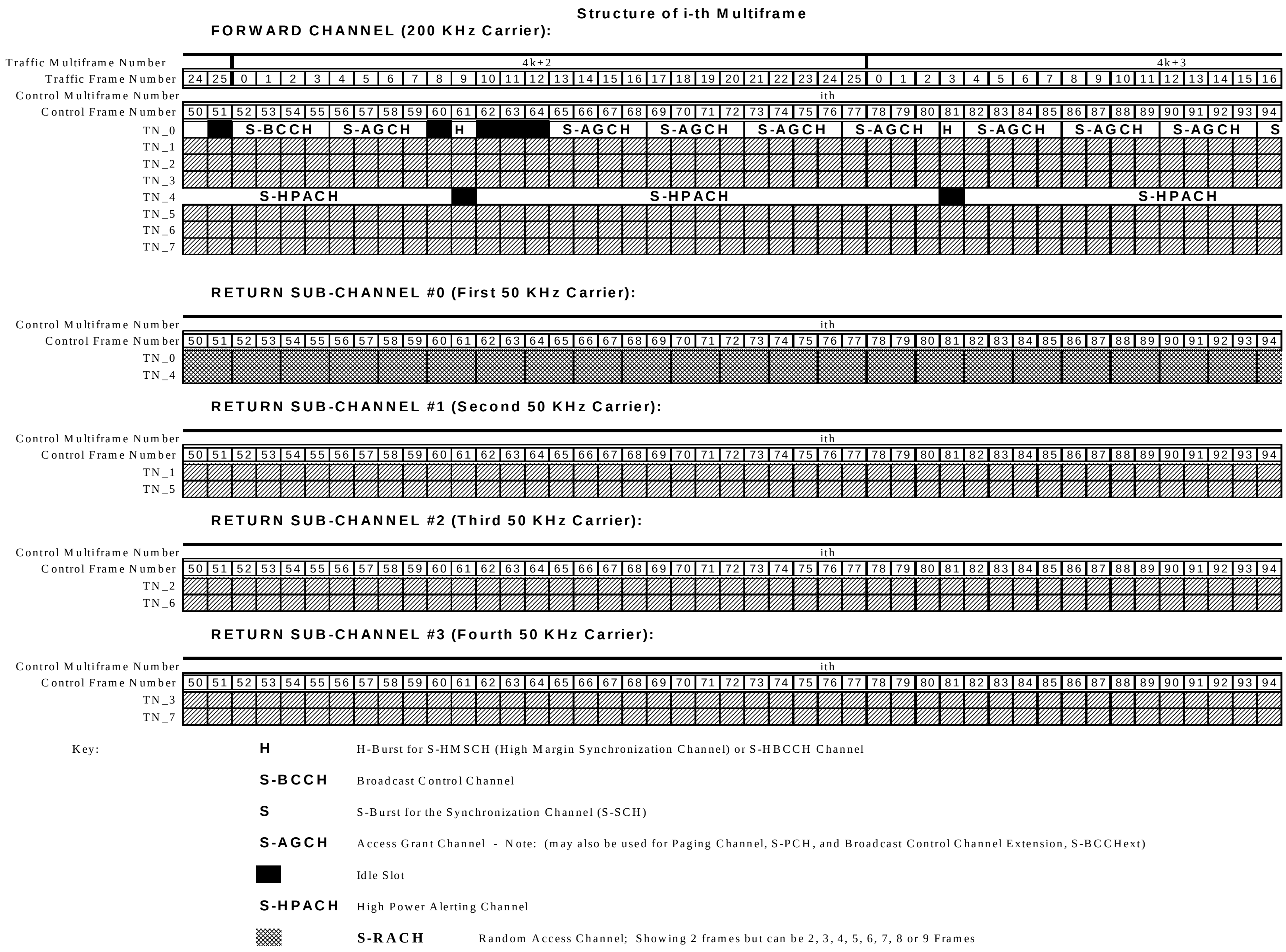

Figure 9.0.2b: TDMA Frame Mapping for Control Channels (IMSI Version)

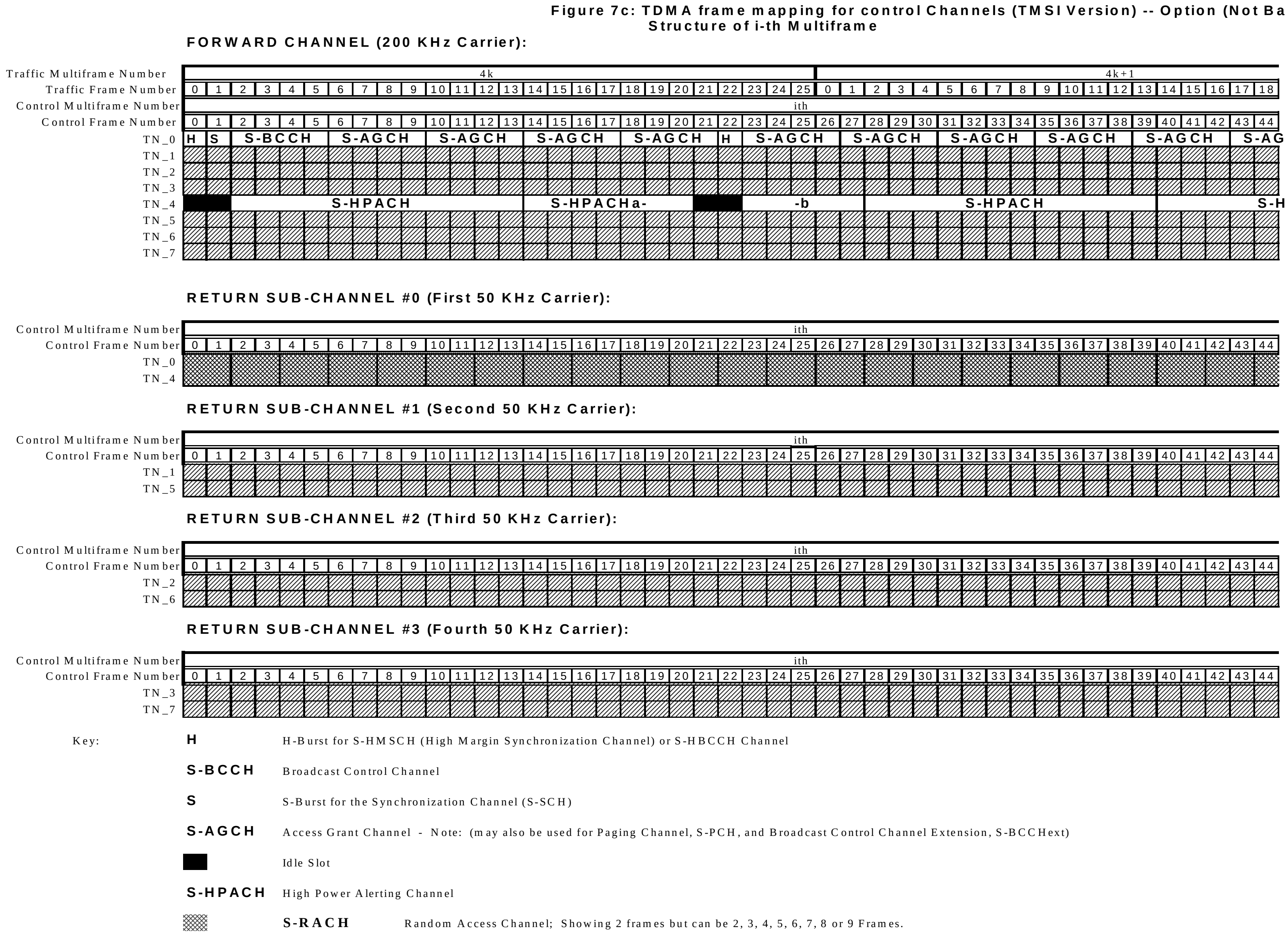

Figure 9.0.2c: TDMA Frame Mapping for Control Channels (TMSI Version)

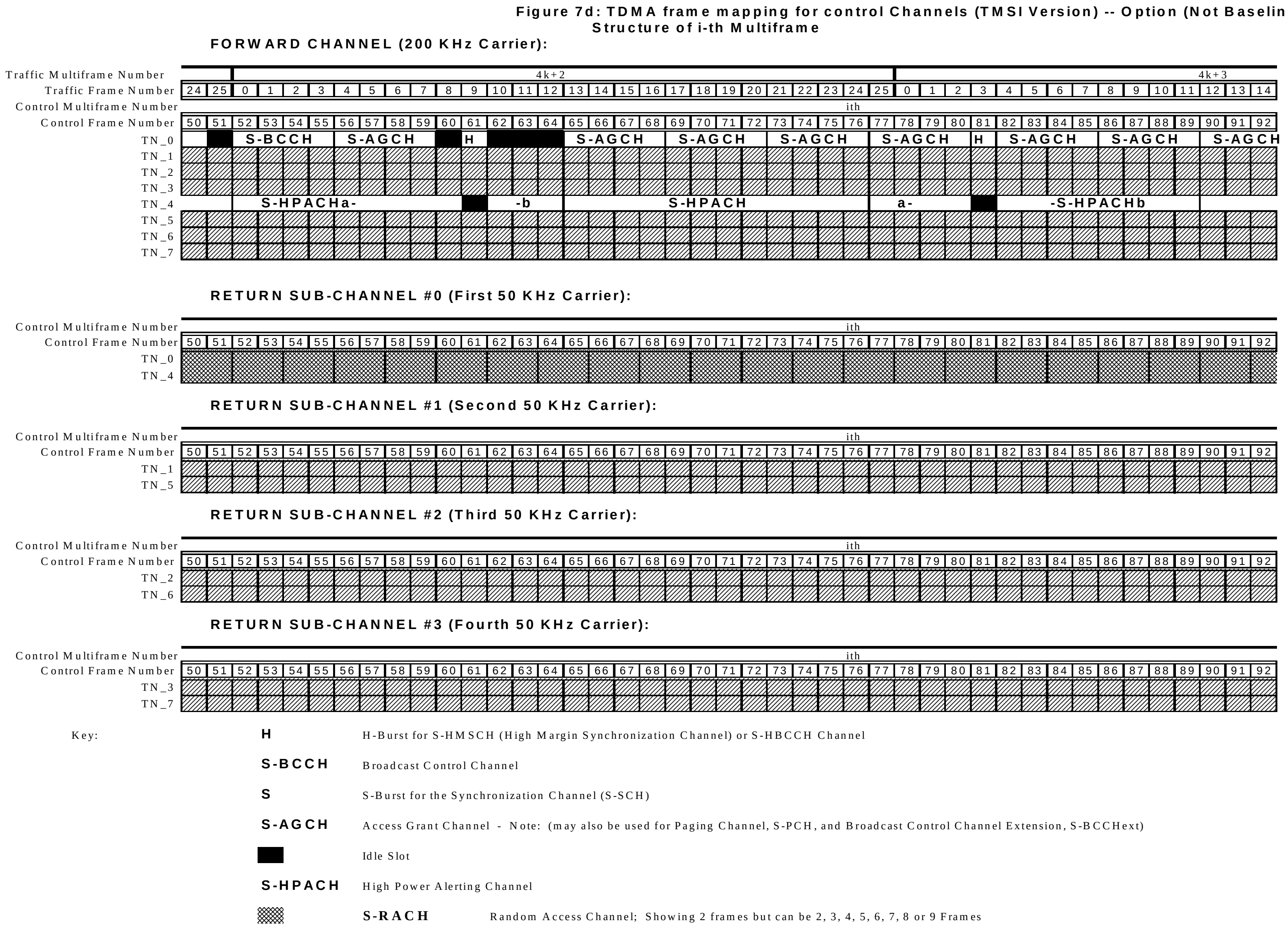

Figure 9.0.2d: TDMA Frame Mapping for Control Channels (TMSI Version)

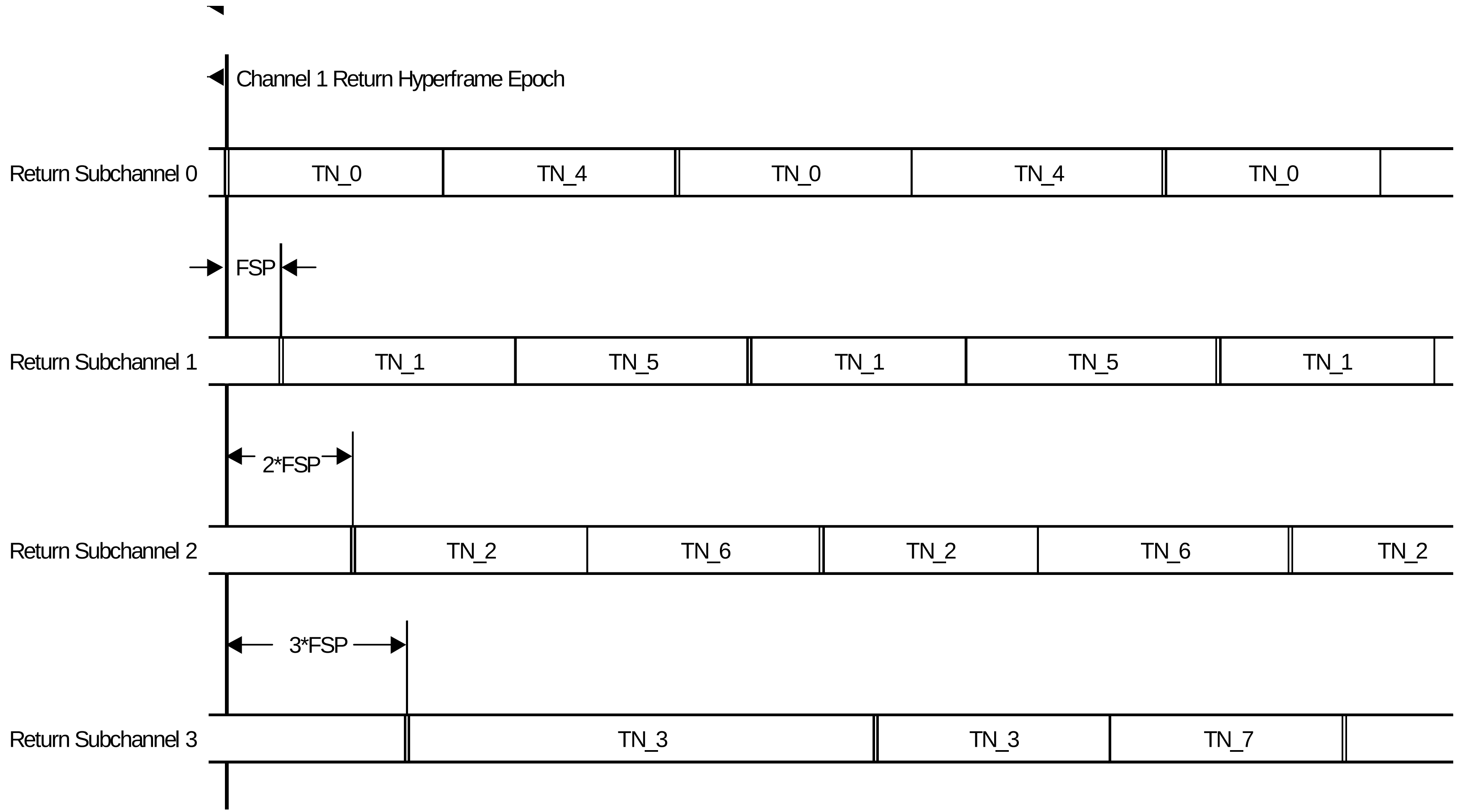

Figure 9.0.3: Timeslot Numbering for Return Link

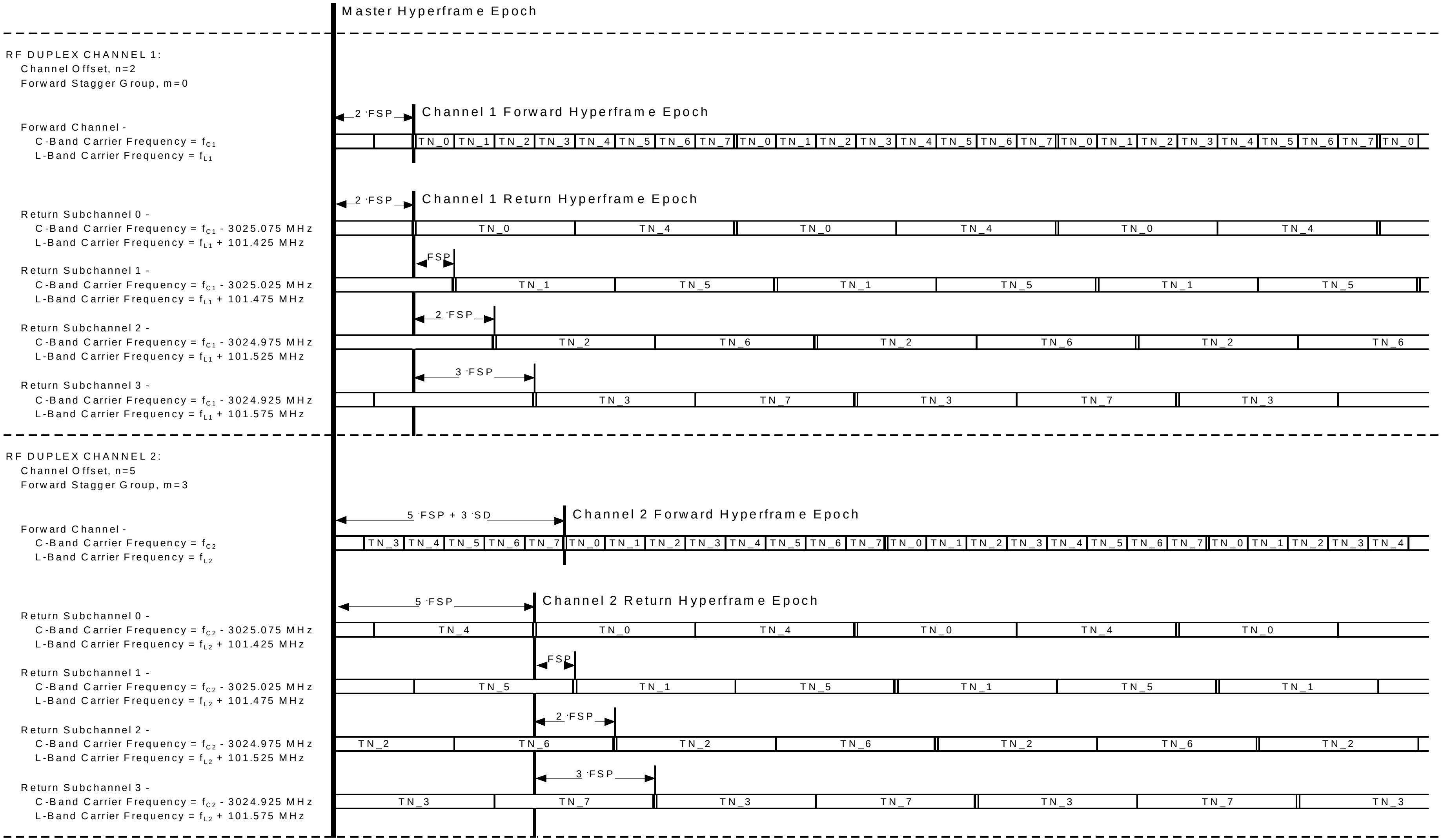

Figure 9.0.4: Forward/Return Timing Offset Convention

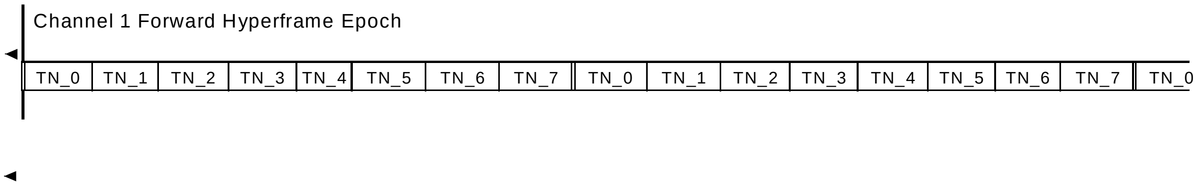

Figure 9.0.5: Timeslot Numbering for Forward Link

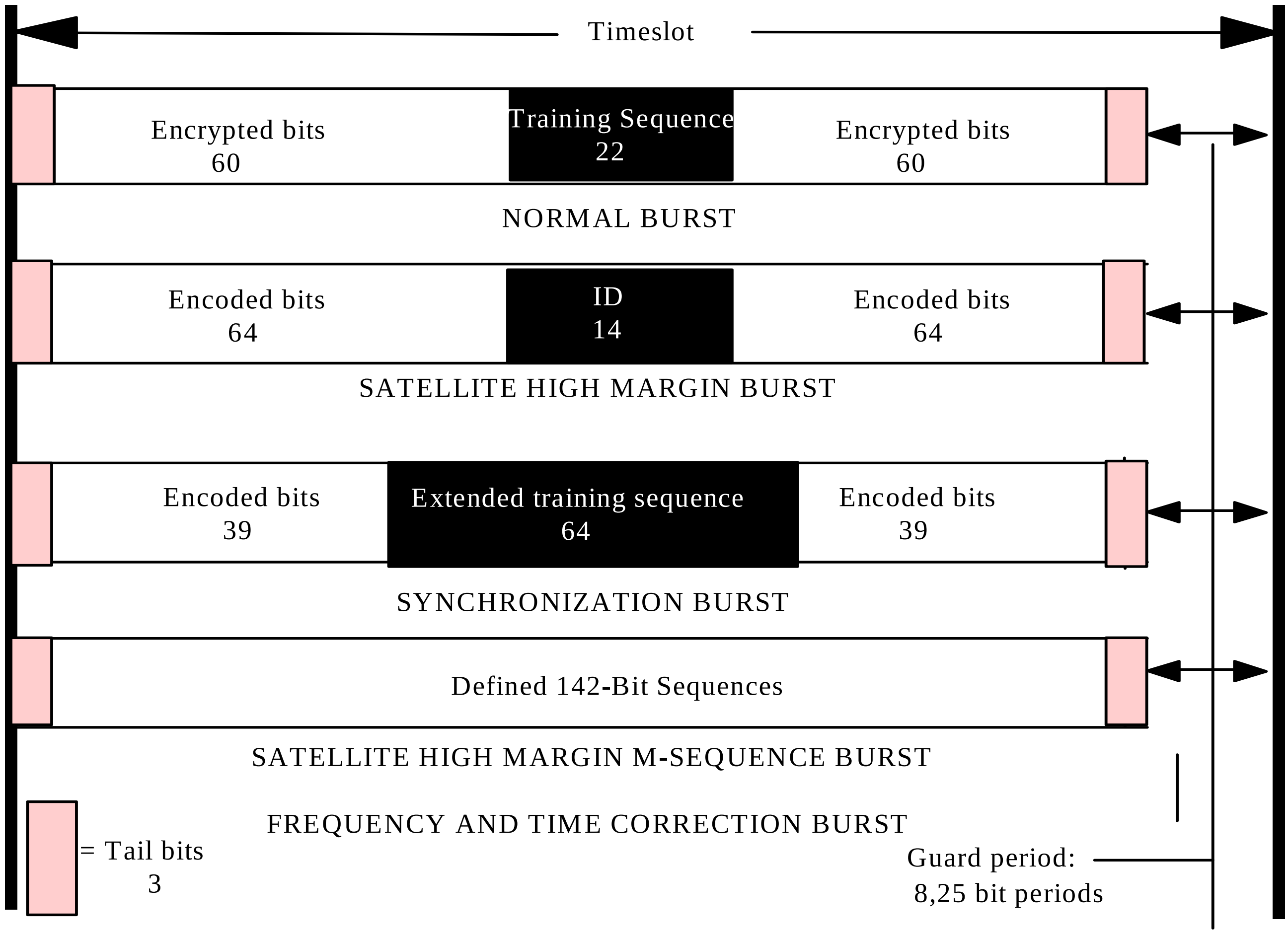

Figure 9.0.6a: Burst Formats

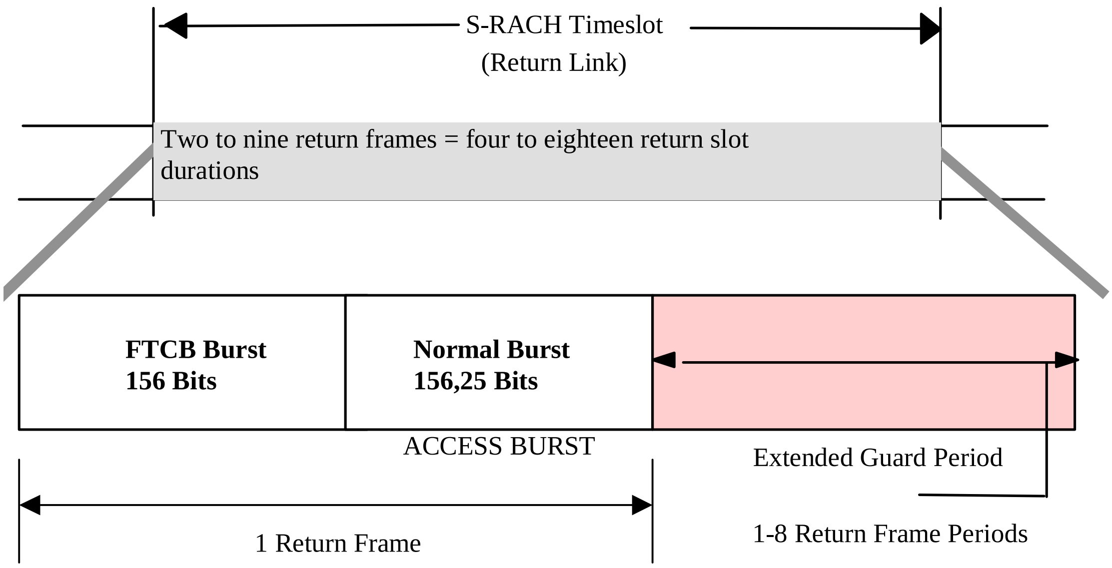

Figure 9.0.6b: Access Burst Format

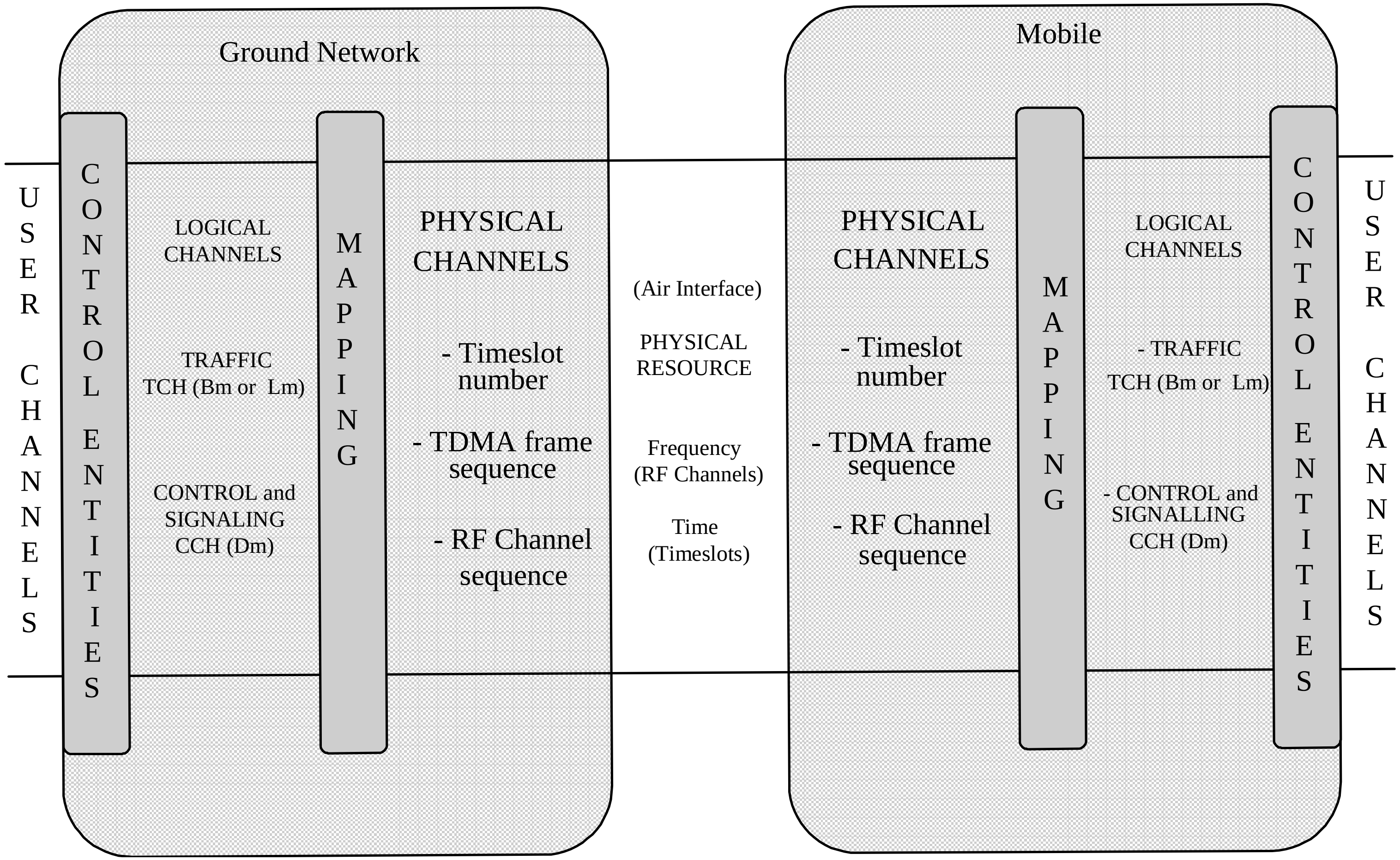

Figure 9.0.7: Mapping of logical channels onto physical channels based on the physical resource

History

Document history		
V1.1.1	March 2001	Publication