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TITLE: USE OF V.8bis CODING AND TRANSACTIONS FOR G.HS

ABSTRACT

V.8bis-style coding and transactions are proposed as the base for G.hs. Three justifications include: (1) Adaptive negotiation; very short transactions for simple situations and detailed negotiations for remote or complex situations are both possible. (2) HDLC coding in V.8bis is cleaner and more efficient than V.8 coding. (3) Either end (central office or remote) can initiate the activation. This contribution suggests which parts of V.8bis should be used for the working text of G.hs and proposes extensions necessary for xDSL functionality.
(This paper will address point #2 of the G.hs Call for Papers)

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1. Introduction:

This contribution provides position, text, and technical proposals for the structure and content of G.hs.

Overall, the following point in the G.hs Call for Papers is addressed

(#2)	Structure and content of the information carrying segments.

Specifically, the following issues from the G.hs section of the *Draft Report of Q4/15* - Geneva TD-47 are addressed:

Open (#9)	Should either end be allowed to initiate the startup?
Open (#14)	G.hs protocol (data format) • start/stop (like V.8), HDLC (like V.8*bis*), or other framing method? • duplex or half duplex exchange at the protocol layer?
Open (#15)	G.hs information content: • proposed fields for consideration include: DSL service, Network, POTS, Operations and maintenance channel, National options, Vendor discretionary functionality. • device control? Powerdown/sleep/warm-start modes • which layers of protocol information should be communicated?

Section 2 contains position statements about G.hs vis-à-vis V.8bis. The following sections suggest which parts of V.8bis should be used for the working text of G.hs (Section 3) and proposes extensions necessary for xDSL functionality (Sections 4 and 5).

2. Position statements for G.hs

G.hs should be based on V.8bis style framing in the following positions.

1. Regarding the G.hs protocol (Issue #14), we propose the use of HDLC style (like V.8bis) framing methods. HDLC coding is cleaner and more efficient than V.8 coding. Frame errors can be detected immediately upon receipt of the CRC, the terminal need not wait for a second reception of the frames to verify the content of the first frame. Excessive round trip delays (e.g. satellite link conditions) which motivate the V.8 style should not be an issue for xDSL terminals.
2. G.hs should allow either terminal to initiate the handshake (Issue #9). This is an integral feature of the V.8bis protocol that should be incorporated into G.hs
3. After the negotiation modulation channels have been established, the remote terminal assumes the role of the initiating station and the central office terminal assumes the role of the responding station in the exchange of messages.
4. G.hs should incorporate the variety of transaction types allowed in V.8bis. The various types of transactions allow for very short transactions for simple situations and detailed negotiations for remote or complex situations. For example, V.8bis transactions #1, #4 and #5 are suitable for fixed equipment and environment situations. In two or three message transfers, pre-established modes of operation can be quickly acknowledged for a quick entry into the modulation startup. For mobile equipment or changing environment situations, transactions such as #2, #3 and #13 allow for a full disclosure of both terminal's capabilities before selecting and acknowledging a mode of operation. However some of the transaction may be eliminated if they are deemed redundant. (e.g. #10, #11, etc)
5. The V.8bis messages are a concatenation of a dual tone followed by modulated message content. It is proposed that only the modulated message portion be used in G.hs. V.8bis signals that do not have a message type code (table 3/V.8bis) should be assigned codes.
6. G.hs should retain the half duplex exchange of V.8bis at the protocol layer. Although both the upstream and downstream "carriers" will remain "on" by transmitting HDLC flags or 1's, the message exchanges should be half duplex.

The rest of this paper assumes the above positions in the presentation of the technical solutions.

Position statement concerning the G.hs information (Issue #15) content will be handled in detail in Section 4.

3. Proposed Working Text.

The text proposed for draft Recommendation G.hs is divided into two section. Text that can be used “AS-IS” or with minor editorial modifications is listed in the section 3.1. G.hs text with proposed extensions or technical changes is described in section 3.2.

3.1 G.hs text to be copied from V.8bis

3.1.1 Section 3/V.8bis: Definitions

Section 3 should be copied in entirety.
Comments:

- Definition 3.9 can be deleted
- Definitions 3.1 and 3.2 will probably need to be modified to reflect xTU-C and xTU-R.

3.1.2 Section 4/V.8bis: Abbreviations

Section 4 should be copied in entirety.
Comments:

The following abbreviations can probably be deleted as they refer to voice band modems and signals: ANS, ANSam, DCME, DIS, OGM, and SAVD.

3.1.3 Section 6/V.8bis: Description of Signals and Messages

Copy sections 6.2 through 6.8 into G.hs Section 6 with the same title.
Make the following word changes:

- "call" → "activation"
- "calling" → "activating"
- "answer" →"responding to activation"?
- "V.8bis" → "G.hs"

Comments:

- Section 6.1 is not needed since it is for telephony.

3.1.4 Section 7/V.8bis: Structure of Signals and messages

Section 7.1 should NOT be copied since it pertains to the dual tone signal.
Section 7.2 introductory text, Section 7.2.1, are handled below
Section 7.2: Messages
Copy section 7.2.2, 7.2.3, 7.2.5, 7.2.6, 7.2.7, 7.2.8, 7.2.9 in entirety. (not 7.2.4)

3.1.5 Section 8/V.8bis: Information field coding format

Copy headings and text from section 8. Tables 3, 4, 5 and 6 will need to be reworked as suggested below.

3.1.6 Section 9/V.8bis: (V.8bis) transactions

Sections 9.1 through 9.7 see below.
Copy section 9.8, 9.9, and 9.10.

3.2 New G.hs text

3.2.1 Section 7: Structure of Signals and messages

Section 7.2 introductory text, Section 7.2.1,

7 Structure of messages

The structure of the messages is described in this clause.

7.2 Messages

Messages CR, MS, CL, CLR, TA, ACK and NAK shall be transmitted using modulation.

7.2.1 Transmitted Power levels

TBD

7.2.4 Preamble

TBD

3.2.2 Section 8: Information field coding format

Tables 3, 5 and 6 will need to be reworked. See Sections 4 and 5 in this paper.

3.2.3 Section 9: (V.8bis) transactions

9 G.hs transactions

All permitted G.hs transactions are described in this clause.

Transactions may be classified in several ways:

- those that are used to determine if the remote end supports G.hs vs. others that assume this knowledge, *a priori*, and minimize the duration of the transaction.

Transactions involving the use of the messages CR, CL and CLR permit a transfer or exchange of capabilities between the two stations.

Transactions involving the use of the message MS allow a specific mode to be requested by either station and permit the other station to accept or decline the transition to the requested mode.

9.1 Permitted G.hs transactions

Permitted V.8 *bis* transactions are summarized in Table 1:

- $MR_{e/d}$ indicates either MR_e or MR_d;
- $CR_{e/d}$ indicates either CR_e or CR_d;
- ACK/NAK indicates either ACK(1), NAK(2) or NAK(3); and
- CL-MS indicates message CL followed immediately by message MS.

NOTES

1 CL and MS are distinct messages (see 7.2.7) and therefore each one begins with a preamble (see 7.2.4). The preamble for MS shall immediately follow the terminating flag(s) of CL, without any silent interval.

2 CL and CR are distinct messages (see 7.2.7) and therefore each one begins with a preamble (see 7.2.4). The preamble for CR shall immediately follow the terminating flag(s) of CL, without any silent interval.

3 MS messages shall contain the minimum number of information octets required to select the desired operating mode. This may be less than the number of information octets received in a preceding CL or CLR message.

Table 1. G.hs transactions (Table 7/V.8bis)

Transaction number	Initiating station	Responding station	Initiating station	Responding station	Initiating station	Responding station
1	$MR_{e/d}\rightarrow$	MS$\longrightarrow$	ACK/NAK			
2	$CR_{e/d}\rightarrow$	CL$\longrightarrow$	MS$\longrightarrow$	ACK/NAK		
3	$CR_{e/d}\rightarrow$	CLR$\longrightarrow$	CL-MS$\rightarrow$	ACK/NAK		
4	MS$\rightarrow$	ACK/NAK				
5	CL$\rightarrow$	MS$\longrightarrow$	ACK/NAK			
6	CLR$\rightarrow$	CL$\longrightarrow$	MS$\longrightarrow$	ACK/NAK		
7	$MR_e\rightarrow$	$MR_d\longrightarrow$	MS$\longrightarrow$	ACK/NAK		
8	$MR_e\rightarrow$	$MR_d\longrightarrow$	$CR_d\longrightarrow$	CL$\longrightarrow$	MS$\longrightarrow$	ACK/NAK
9	$MR_e\rightarrow$	$MR_d\longrightarrow$	$CR_d\longrightarrow$	CLR$\longrightarrow$	CL-MS$\rightarrow$	ACK/NAK
10	$MR_e\rightarrow$	$CR_d\longrightarrow$	CL$\longrightarrow$	MS$\longrightarrow$	ACK/NAK	
11	$MR_e\rightarrow$	$CR_d\longrightarrow$	CLR$\longrightarrow$	CL-MS$\rightarrow$	ACK/NAK	
12	$CR_e\rightarrow$	$CR_d\longrightarrow$	CL$\longrightarrow$	MS$\longrightarrow$	ACK/NAK	
13	$CR_e\rightarrow$	$CR_d\longrightarrow$	CLR$\longrightarrow$	CL-MS$\rightarrow$	ACK/NAK	

9.2 Transactions permitted at any time on local loops

Similarly, on a local loop either station may initiate a G.hs transaction.

The station initiating a G.hs transaction is designated as the initiating station and the other station the responding station. These designations remain for the duration of the ensuing transaction.

9.2.1 Transactions with no *a priori* knowledge of G.hs support

Transaction numbers 1, 2 and 3 are used to minimize the potential disturbance experienced at a responding station which does not support G.hs. They shall be used whenever the following conditions is true:

- the initiating station does not know whether G.hs is supported by the responding station

Transaction number 1 is used to select an operating mode without first establishing common capabilities. This transaction is used when the responding station has prior knowledge of the capabilities of the initiating station.

Transaction numbers 2 and 3 are used to exchange information about each station's capabilities and then select an operating mode.

9.2.2 Transactions with *a priori* knowledge of G.hs capability

Transaction numbers 4, 5 and 6 minimize the time duration from initiation of a G.hstransaction to initiation of the selected mode of operation. They may be used when the following condition is true:

- the initiating station has *a priori* knowledge that G.hs capability is supported by the responding station

They perform the same functions as transaction numbers 1, 2 and 3.

Transaction numbers 7 through 13 shall only be used at the beginning of an activation. They are intended to allow the activating station to take control of the outcome of the transaction.

9.5 Use of the negative acknowledge message (NAK)

When a station receives an MS message requesting a mode that it is unable to invoke, it shall send either a NAK(2) message or a NAK(3) message, depending on whether it is temporarily unable to invoke the mode, or it does not support or has disabled the requested mode (see 9.8 for error recovery procedures).

NAK(3) can also send frames with the bits of the offending parameters set to 1.

9.6 State transition diagrams

Fig. 1 and Fig. 2 show state transition diagrams for the initiating and responding stations for the permitted G.hs transactions outlined above.

Fig. 1 . State Transition Diagram - Initiating Station (Figure 14/V.8bis)

Fig. 2. State Transition Diagram - Responding Station (Figure 15/V.8bis)

The state transition diagrams show state information (the last transmitted signal or message, and, in parentheses, the signals and messages that the receiver is next expecting) and transition information (detected signal or received message/transmitted signal or message that caused the state change).

Broken lines in the diagrams indicate states and transitions only permitted upon automatic answering of a GSTN call. Solid lines in the diagrams indicate states and transitions permitted at any time during a call.

When a CL or CLR message is received with the "additional information available" parameter set to binary ONE in the identification field (see Table 5-1), the receiving station may send an ACK(2) message to request further information to be sent (see 9.10). The transition information CL/ACK(2) or CLR/ACK(2) has the effect of returning the transmitting station to the state which it just left.

When an ACK(2) message is received, further information shall be sent. Transition information ACK(2)/CL or ACK(2)/CLR has the effect of returning the transmitting station to the state which it just left.

Transmission of signals associated with a selected mode shall begin immediately after the transmission of ACK(1).

9.7 Suppression of ACK(1) after an MS message

TBD

3.2.4 Section 10: Operating Procedures

10 Operating procedures

The initial activation of G.hs is described TBD. Either the remote terminal or the central office terminal may initiate modulation channels. After the negotiation modulation channels have been established, the remote station is always considered the initiating modem in terms of the transaction messages. Likewise, the central office terminal is the responding station.

TBD

3.3 No proposals at this time

3.3.1 Section 1: Scope

3.3.2 Section 2: References

3.3.3 Section 5: Overview

4. Discussion of Areas that need to be modified or extended

This sections discusses the motivation for areas in G.hs that cannot be copied directly from V.8bis. The specific technical proposals are contained in Section 5.

4.1 How should the V.8bis Tables be replaced?

4.1.1 Necessary Information

Recommendation V.8bis tables (e.g. 6-2, 6-3) imply certain types of application groups for end-to-end communication. However G.hs will be negotiating network access so the primary negotiation content will be the type of services offered, available, and capable at a particular access node. Typical quantities of interest include:

- Amount of Bandwidth
  - minimum bandwidth
  - maximum bandwidth
  - average bandwidth
- Type of Bandwidth
  - low latency
  - constant latency
  - Bursty

Acceptance of those communication bandwidth requests dramatically depend on the capabilities of the terminal device and the capabilities of the channel.

So the parameters to be negotiated by and during G.hs seem to be:

- Service Parameters (new)
  - Amount/type of bandwidth (desired)(CL/MS)
- Channel capabilities (new)
  - probe request parameters (CR) rudimentary Bandwidth and noise information (implicit), known CO splitter info (CL possibly)
- Modulations available
  - Which type of xDSL etc. (CL), Japan ping-pong ISDN environment (CL/MS)
- Protocols available (?)
  - error correction, data compression etc.?

4.1.2 Organizational Structure

There are several possible way to organize the data exchange. We start with a review of V.8 and V.8bis organizational structures.

Both V.8 and V.8bis use hierarchical tree structures. V.8 has two level and V.8bis has three levels.

- Call Function
- Modulation Mode
- Protocols
- GSTN Access

Figure 1. V.8 style hierarchy

- Identification - N1 (section 8.3 - Tables 5-x Messages: MS/CL/CLR)
  - (V.8/ACK type)
- Identification -s1
  - Network Types - N2

- Standard Information - N1 (section 8.4 - Table 6-1 Messages: MS/CL/CLR)
  - blank (except non-standard)
- Standard Info S1 (Table 6-2)
  - SIF - Data - N2 (Table 6-3)
  - error control
  - data compression
  - Applications (Octet 2)
  - Modulations (Octet 2 -3)
- SIF - SVD - N2 (Table 6-4)
  - Applications (V.70)
  - Modulations (V.61, V.34)
  - error control (octet 2)
  - data compression
  - SIF - H.324 -N2 (Table 6-5)
  - SIF - H.324- S2
  - SIF - H.324 - N3
    - Protocols
  - etc

- Non-standard Info (section 8.5)

Figure 2. V.8bis style hierarchy

In summary:
- V.8 had 4 major categories with sub categories
- V.8bis has 2 major and broad categories (with two types each) with sub categories (in one type of category)

Based on the necessary Information in section 4.1.1 and reviewing the V.8/V.8bis we propose that Standard Information Field of G.hs has 4 specific major categories with sub categories. Each major category will retain the NPars and SPars method shown in Figure 7/V.8bis. Some example sub-parameters are also shown in Figure 3.

- Identification - N1 (section 8.3 - Tables 5-x Messages: MS/CL/CLR)
  - (CR/CL / ACK type)

- SIF - Service Parameters N (No sub-parameters)
- SIF - Service Parameters S (sub-parameters)
  - Amount/type of bandwidth(CL/MS)
- SIF - Channel capabilities N
- SIF - Channel capabilities S
  - probe request parameters (CR)
  - known splitter information (CL)
- SIF - Modulations available N
- SIF - Modulations available S
  - Which type of xDSL etc. (CL),
  - Regional considerations (i.e., use of a specific Annex in a Recommendation)(CL/MS)
- SIF - Protocols available (?)
- SIF - Protocols available (?)
  - error correction, data compression etc.?

- Non-standard Info (section 8.5)

Figure 3. Proposed G.hs hierarchy

4.1.2.1 Transmission of the service parameters

Obviously there are many combinations and requirements for those types of parameters. Possible solutions:

- classes or profiles of service
- parameter based

Since the number of parameters appears to be fewer than the possible number of combinations or profiles we propose parameter based exchange. However, as the work progress on G.dmt and G.lite, several parameter exchanges may be relegated to G.hs. If the number becomes excessive, negotiation of profiles of parameters may be more practical.

4.1.2.2 Comments on Messages

We propose that CR will also have parameters besides CL/CLR/MS. The CR parameters would be used to specify channel probing or other tests to be performed during CL. See section 4.2 for details.

For CLR messages where some frames may be repeated twice for the "list" and the "request"… so a bit should be set in the Spar frame to indicate capability list (L) or capability request ®.

4.2 Inclusion of methods for channel probing

As proposed in Delayed Document D.204, a method to assess the characteristics of the communication channel should be included as part of the G.hs initial handshake. In V.8bis there is a signal Capabilities Request (CR) that is intended to query the other terminal about it's modulation capabilities. The CR signal can be extended to include an explicit request for communication channel capabilities.

For connection situations were the terminals and channel capabilities are considered stable, transactions that do not use CR/CL would allow very quick start up.

For a terminal that desires to know the channel capabilities, the terminal would issue a CR message that would specify the parts of the communication channel that it wants tested. This would be implemented with some additional octets in the CR signal as shown in Table 19. The terminal responding to the CR signal shall indicate which probing tone ranges it is transmitting in its CL message and concurrently transmit the signals.

If both terminals each desire to have their own private channel capabilities information, transactions with two capabilities requests (including CLR), such as 3, 9, 12, and 13, can be used.

5. Proposals for Areas that need to be modified or extended

5.1 Additions to Table 3

Codepoints for the MR, CR and ES message types are needed. Codepoint 1111 should be marked as reserved.

TABLE 3/V.8 *bis* → *G.hs*

Message type field format

Message type	Bit numbers 4	3	2	1
MS	0	0	0	1
CL	0	0	1	0
CLR	0	0	1	1
ACK(1)	0	1	0	0
ACK(2)	0	1	0	1
NAK(1)	1	0	0	0
NAK(2)	1	0	0	1
NAK(3)	1	0	1	0
NAK(4)	1	0	1	1
MR	1	1	0	0
CR	1	1	0	1
ES ??	1	1	1	0
Reserved for ITU-T	1	1	1	1

5.2 Replacement of Tables 5-x and 6-x

These new tables emphasize service requirements instead of "application groups" and follow the structure discussed in Section 4.1.2. These tables are merely examples of the types and methodology of parameter exchange.

5.2.1 Service Parameters

Table 2. Service Parameters field - {NPar(1)} coding

SPar(1)s	8	7	6	5	4	3	2	1
This message contains CL data	x	x	x	x	x	x	x	1
Reserved for ITU-T	x	x	x	x	x	x	1	x
Reserved for ITU-T	x	x	x	x	x	1	x	x
Reserved for ITU-T	x	x	x	x	1	x	x	x
Reserved for ITU-T	x	x	x	1	x	x	x	x
Reserved for ITU-T	x	x	1	x	x	x	x	x
Reserved for ITU-T	x	1	x	x	x	x	x	x
No parameters in this octet	x	0	0	0	0	0	0	0

Table 3. Service Parameters field - {SPar(1)} coding - Octet 1

SPar(1)s	8	7	6	5	4	3	2	1
Datarate Amount Downstream	x	x	x	x	x	x	x	1
Datarate Amount Upstream	x	x	x	x	x	x	1	x
Datarate Type Downstream	x	x	x	x	x	1	x	x
Datarate Type Upstream	x	x	x	x	1	x	x	x
Reserved for ITU-T	x	x	x	1	x	x	x	x
Reserved for ITU-T	x	x	1	x	x	x	x	x
non standard service requirement	x	1	x	x	x	x	x	x
No parameters in this octet	x	0	0	0	0	0	0	0

Table 4. Service Parameters field - {SPar(1)} coding - Octet 2

SPar(1)s	8	7	6	5	4	3	2	1
Spectrum first usable frequency	x	x	x	x	x	x	x	1
Spectrum maximum frequency - upstream	x	x	x	x	x	x	1	x
Spectrum maximum frequency - downstream	x	x	x	x	x	1	x	x
Reserved for ITU-T	x	x	x	x	1	x	x	x
Reserved for ITU-T	x	x	x	1	x	x	x	x
Reserved for ITU-T	x	x	1	x	x	x	x	x
non standard frequency usage	x	1	x	x	x	x	x	x
No parameters in this octet	x	0	0	0	0	0	0	0

Table 5. Service Parameters field – Datarate Amount Downstream/Upstream {NPar(2)} coding - Octet 1

NPar(2)s	8	7	6	5	4	3	2	1
Reserved for ITU-T	x	x	1	1	1	1	1	1
Unspecified by terminal	x	x	0	0	0	0	0	0
Average bandwidth (bits 6-1 x 512kbps)	x	x	x	x	x	x	x	x

Table 6. Service Parameters field – Datarate Amount Downstream/Upstream {NPar(2)} coding - Octet 2

NPar(2)s	8	7	6	5	4	3	2	1
Reserved for ITU-T	x	x	1	1	1	1	1	1
Unspecified by terminal	x	x	0	0	0	0	0	0
Maximum bandwidth (bits 6-1 x 512kbps)	x	x	x	x	x	x	x	x

Table 7. Service Parameters field – Datarate Amount Downstream/Upstream {NPar(2)} coding - Octet 3

NPar(2)s	8	7	6	5	4	3	2	1
Reserved for ITU-T	x	x	1	1	1	1	1	1
Unspecified by terminal	x	x	0	0	0	0	0	0
Minimum bandwidth (bits 6-1 x 512kbps)	x	x	x	x	x	x	x	x

Table 8. Service Parameters field – Datarate type {NPar(2)} coding

NPar(2)s	8	7	6	5	4	3	2	1
Low latency	x	x	x	x	x	x	x	1
Constant latency	x	x	x	x	x	x	1	x
Bursty	x	x	x	x	x	1	x	x
etc	x	x	x	x	1	x	x	x
	x	x	x	1	x	x	x	x
	x	x	1	x	x	x	x	x
No parameters in this octet	x	x	0	0	0	0	0	0

Table 9. Service Parameters field – Spectrum first usable frequency {NPar(2)} coding

NPar(2)s	8	7	6	5	4	3	2	1
Reserved for ITU-T	x	x	1	1	1	1	1	1
Unspecified by terminal	x	x	0	0	0	0	0	0
spectrum first usable frequency (bits 6-1 x 5KHz)	x	x	x	x	x	x	x	x

Table 10. Service Parameters field – Spectrum maximum frequency - upstream {NPar(2)} coding

NPar(2)s	8	7	6	5	4	3	2	1
Reserved for ITU-T	x	x	1	1	1	1	1	1
Unspecified by terminal	x	x	0	0	0	0	0	0
spectrum maximum frequency - upstream(bits 5-1 x 1MHz)	x	x	1	x	x	x	x	x
spectrum maximum frequency - upstream(bits 5-1 x 10KHz)	x	x	0	x	x	x	x	x

Table 11. Service Parameters field – Spectrum maximum frequency - downstream {NPar(2)} coding

NPar(2)s	8	7	6	5	4	3	2	1
Reserved for ITU-T	x	x	1	1	1	1	1	1
Unspecified by terminal	x	x	0	0	0	0	0	0
spectrum maximum frequency - downstream(bits 5-1 x 1MHz)	x	x	1	x	x	x	x	x
spectrum maximum frequency - downstream(bits 5-1 x 10KHz)	x	x	0	x	x	x	x	x

5.2.2 Modulations

Table 12. Modulations field - {SPar(1)} coding - Octet 1

SPar(1)s	8	7	6	5	4	3	2	1
G.dmt	x	x	x	x	x	x	x	1
G.lite	x	x	x	x	x	x	1	x
G.hdsl	x	x	x	x	x	1	x	x
VDSL	x	x	x	x	1	x	x	x
HDSL2	x	x	x	1	x	x	x	x
T1.413	x	x	1	x	x	x	x	x
Non-standard capabilities (modulations)	x	1	x	x	x	x	x	x
No parameters in this octet	x	0	0	0	0	0	0	0

Table 13. Modulations field - {SPar(1)} coding - Octet 2

SPar(1)s	8	7	6	5	4	3	2	1
Reserved for ITU-T	x	x	x	x	x	x	x	1
Reserved for ITU-T	x	x	x	x	x	x	1	x
Reserved for ITU-T	x	x	x	x	x	1	x	x
Reserved for ITU-T	x	x	x	x	1	x	x	x
Reserved for ITU-T	x	x	x	1	x	x	x	x
Reserved for ITU-T	x	x	1	x	x	x	x	x
Reserved for ITU-T	x	1	x	x	x	x	x	x
No parameters in this octet	x	0	0	0	0	0	0	0

Table 14. Modulation – G.dmt {NPar(2)} coding

NPar(2)s	8	7	6	5	4	3	2	1
Use G.dmt Annex A (over POTS)	x	x	x	x	x	x	x	1
Use G.dmt Annex B (over ISDN)	x	x	x	x	x	x	1	x
Use G.dmt Annex C (same cable as Japanese ISDN)	x	x	x	x	x	1	x	x
etc	x	x	x	x	1	x	x	x
	x	x	x	1	x	x	x	x
	x	x	1	x	x	x	x	x
No parameters in this octet	x	x	0	0	0	0	0	0

Table 15. Modulation – G.hdsl {NPar(2)} coding

NPar(2)s	8	7	6	5	4	3	2	1
Use G.hdsl Annex B	x	x	x	x	x	x	x	1
	x	x	x	x	x	x	1	x
	x	x	x	x	x	1	x	x
etc	x	x	x	x	1	x	x	x
	x	x	x	1	x	x	x	x
	x	x	1	x	x	x	x	x
No parameters in this octet	x	x	0	0	0	0	0	0

Table 16. Modulation – G.lite {NPar(2)} coding - Octet 1

NPar(2)s	8	7	6	5	4	3	2	1
Specify parameters or profiles for G.lite	x	x	x	x	x	x	x	1
	x	x	x	x	x	x	1	x
	x	x	x	x	x	1	x	x
etc	x	x	x	x	1	x	x	x
	x	x	x	1	x	x	x	x
	x	x	1	x	x	x	x	x
No parameters in this octet	x	x	0	0	0	0	0	0

5.3 Initiation of channel probing

5.3.1 Additional octets needed in CR

As mentioned in the position statements, all G.hs messages will not use the dual tone portion of the message and will use the message portion only. In V.8bis, Capabilities Request (CR) was simply a dual tone signal without a modulated message. When adding the channel capabilities request portion, some octets are need to specify the probe ranges. We propose that the necessary octets are similar extension of the identification fields that relate to the network type.

Splitter Information is only transmitted if it is known.

Table 17. Channel Capabilities – {SPar(1)} coding

SPar(1)s	8	7	6	5	4	3	2	1
Network type (Note)	x	x	x	x	x	x	x	1
Access Channel Probe	x	x	x	x	x	x	1	x
Splitter Information- CO	x	x	x	x	x	1	x	x
Splitter Information - Remote	x	x	x	x	1	x	x	x
Reserved for allocation by the ITU-T	x	x	x	1	x	x	x	x
Reserved for allocation by the ITU-T	x	x	1	x	x	x	x	x
Reserved for allocation by the ITU-T	x	1	x	x	x	x	x	x
No parameters set in this octet	x	0	0	0	0	0	0	0

NOTE – The use of this bit is under study.

Table 18. Channel Capabilities – Network type {NPar(2)} coding ???

Network Type NPar(2)s	8	7	6	5	4	3	2	1
Cellular access (Note)	x	x	x	x	x	x	x	1
ISDN access (Note)	x	x	x	x	x	x	1	x
xDSL access	x	x	x	x	x	1	x	x
Reserved for allocation by the ITU-T	x	x	x	x	1	x	x	x
Reserved for allocation by the ITU-T	x	x	x	1	x	x	x	x
Non-standard network (Note)	x	x	1	x	x	x	x	x
No parameters set in this octet	x	x	0	0	0	0	0	0

NOTE – The assignment of the codepoints for ISDN access and non-standard network is provisional. The use of these codepoints is the subject of further study.

Table 19. Channel capabilities – Access Channel Probe {NPar(2)} coding

Access Channel Probe NPar(2)s	8	7	6	5	4	3	2	1
Probe in band 0 -4kHz (Voice) (psuedo random noise)	x	x	x	x	x	x	x	1
Probe in band 4 kHz - 90 kHz	x	x	x	x	x	x	1	x
Probe in Band 90 kHz - 150 kHz	x	x	x	x	x	1	x	x
Probe in Band 150 kHz - 1100 kHz	x	x	x	x	1	x	x	x
Probe in Band 1100 kHz - 30,000 kHz	x	x	x	1	x	x	x	x
Non-standard probe	x	x	1	x	x	x	x	x
No parameters in this octet	x	x	0	0	0	0	0	0

NOTE – Probing tones shall not be transmitted in the ranges assigned for the G.hs modulations in use.

Table 20. Channel capabilities – Splitter Information {NPar(2)} coding - Octet 1

Access Channel Probe NPar(2)s	8	7	6	5	4	3	2	1
LPF is voice	x	x	x	x	x	x	x	1
LPF is USA ISDN	x	x	x	x	x	x	1	x
LPF is German ISDN	x	x	x	x	x	1	x	x
Reserved for ITU-T	x	x	x	x	1	x	x	x
Reserved for ITU-T	x	x	x	1	x	x	x	x
Non-standard LPF	x	x	1	x	x	x	x	x
No parameters in this octet	x	x	0	0	0	0	0	0

Table 21. Channel capabilities – Splitter Information {NPar(2)} coding - Octet 2

Access Channel Probe NPar(2)s	8	7	6	5	4	3	2	1
HPF is 25 kHz (voice)	x	x	x	x	x	x	x	1
HPF is 90kHz USA ISDN	x	x	x	x	x	x	1	x
HPF is 150kHz (ADSL with European ISDN)	x	x	x	x	x	1	x	x
HPF is 300 kHz (VDSL)	x	x	x	x	1	x	x	x
Reserved for ITU-T	x	x	x	1	x	x	x	x
Non-standard HPF	x	x	1	x	x	x	x	x
No parameters in this octet	x	x	0	0	0	0	0	0

5.3.2 Additional octets in CL

Same as CR. These are used to indicate what probing tones that the responder is actually transmitting. Thus it provides a primitive form of negotiation of the channel probe tones.

6. Summary:

1. Agenda Item: G.hs
2. Expectations: The committee accept as a whole or in part the text suggested in Chapter 2 and Chapter 4 as working text for G.hs.