

STUDY GROUP 15

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Question: 4/15

SOURCE<sup>1</sup>: Matsushita, Adtran

TITLE: G.shdsl: G.hs Encoding for G.shdsl Pre-Activation.

### ABSTRACT

This contribution proposes specific G.hs octet encoding for the G.shdsl Pre-Activation sequence described in NT-031 and NT-032. Alternative codings for sets of information of more detailed information are also presented.

## 1. Introduction

For performing power backoff (PBO) measurements or Line Probing (LP), NT-031 describes an overall framework and procedure, while NT-032 describes specific probe signals for G.shdsl. This contribution discusses the specific encoding of G.994.1 (G.hs) octets. Section 3 details a coding method for the probe signals as described in NT-032. Section 4.1 describes an alternative encoding method that uses pre-determined sets of parameters to reduce the number of octets transmitted. Alternatively, section 4.2 describes an encoding method that allows meticulous control of the probe signal at the expense of more octets.

This contribution proposes a solution to implement the agreements in sections 4.11 and 7.3 of the G.shdsl Issues list (NT-U15R1).

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<sup>1</sup> Contact: Stephen Palm  
Matsushita Graphic Communication Systems

Richard Goodson  
Adtran

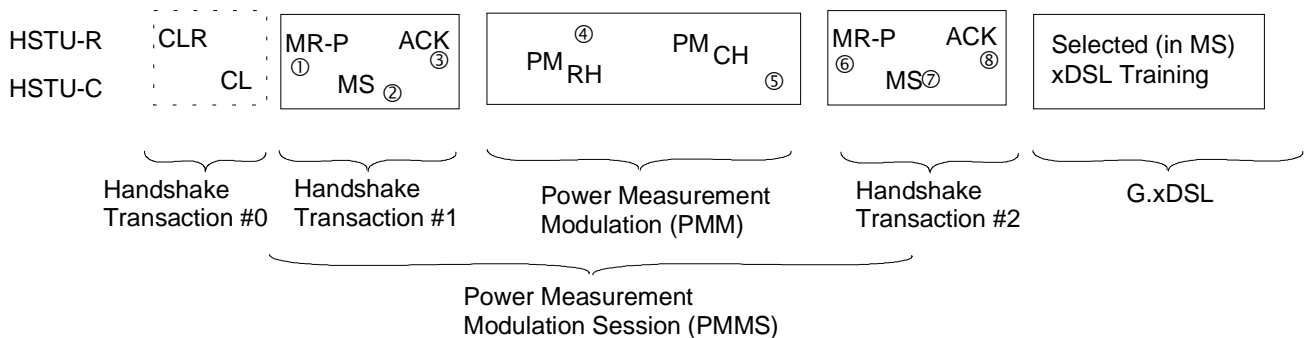
T: +81 3 5434 7078  
F: +81 3 5434 7159  
E: [palm@kiwin.com](mailto:palm@kiwin.com)  
T: +1 256 963 8664  
F: +1 256 963 2386  
E: [richard.goodson@adtran.com](mailto:richard.goodson@adtran.com)

## 2. Power Back Off Measurement Procedure Overview

This section provides a brief overview of the concepts in NT-031.

### 2.1 Session Summary

In this contribution, the MR-P (MR with parameters) message is used. The MR-P message is used to initiate a **Transaction B** (§10.1.2/G.994.1) to negotiate and select the parameters for a PBO/LP mode of G.shdsl. At the termination of Transaction B, the HSTU-X perform a clear-down (§11.3/G.994.1) and initiates the Power Measurement Modulation (PMM) in which signals are transmitted from the HSTU-X to measure for Power Back Off (PBO). After the PMM, the HSTU-R restarts G.944.1 procedures and again initiates a Transaction B with the MR-P message. In this transaction, the parameters for the PBO are exchanged and the final xDSL mode of operation is selected. Following the G.994.1 clear-down, G.shdsl begins training. The entire sequence is illustrated in Figure 1.



**Figure 1. PBO measurement and xDSL startup sequence**

### 2.2 Message Construction Summary

In the MR-P message, the HSTU-R requests a PMMS mode by setting a NPar(2) bit. The parameters or parameter sets are requested through SPar(2) and NPar(3) octets. Similarly, the HSTU—C, responds with similar parameters set in the octets. After the HSTU-R sends the ACK message, the G.994.1 session would clear-down as per §11.3/G.994.1 and then the PMM signals would be sent. The procedure assumes that after the PMMS measurements, the xTU-X will return control to G.994.1.

During the PMM, the xTU-R would send the first signals and then the xTU-C would send signals. The characteristics and timing of the PMM signals were predetermined in the G.994.1 transaction B exchange.

After each side has performed their measurements and analysis, they must inform the opposite side of their specific value request of the PBO and possible parameters such as data rates. Again this is a request with parameters so it would require the HSTU-R to use MR-P and the HSTU-C to use MS in a B transaction.

### 3. Encoding of NT-032 Parameters

The PMM signal is composed of signal  $PM_{RH}$  transmitted from the HSTU-R and  $PM_{CH}$  transmitted from the HSTU-C as shown in Figure 2.  $PM_{RH}$  is composed multiple segments  $P_{ri}$  with periods of silence between. Likewise,  $PM_{CH}$  is composed multiple segments  $P_{ci}$  with periods of silence between.

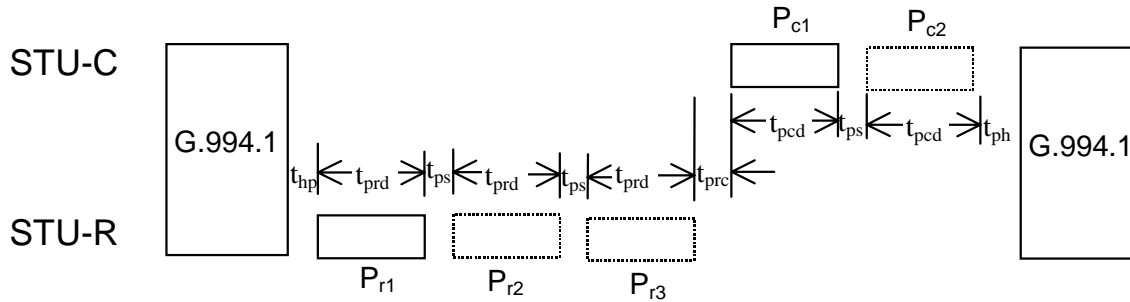


Figure 2. Pre-Activation sequence (Fig. 6-9)/NT-032

NT-032 specifies some of the parameters as fixed and others as variable. Octet encoding is needed for the following variable parameters:

Parameter	Resolution	Range Min	Range Max	Encoding
$T_{prd}, T_{pcd}$	50ms	50 ms	3 s	Table 7
$P_{ri}, P_{ci}$ Data Rate	$n * 64$ kbit/s	$n=3$	$n=36; 1544$ kbit/s	Table 5
$P_{ri}, P_{ci}$ Back off	1.0 dB	0 dB	-31 dB	Table 6

The proposed encoding are shown in Table 1 through Table 7. An overview of the complete session with all of the octets is shown in Table 8. Note that Table 2 picks which mode G.shdsl will enter (pre-activation or training) and Table 3 indicates where the parameters for that mode can be found.

Table 1. Standard information field - SPar(1) coding

SPar(1)s	8	7	6	5	4	3	2	1
G.992.1 - Annex A	x	x	x	x	x	x	x	1
G.992.1 - Annex B	x	x	x	x	x	x	1	x
G.992.1 - Annex C	x	x	x	x	x	1	x	x
G.992.2 - Annex A/B	x	x	x	x	1	x	x	x
G.992.2 - Annex C	x	x	x	1	x	x	x	x
G.SHDSL	x	x	1	x	x	x	x	x
Reserved	x	1	x	x	x	x	x	x
No parameters in this octet	x	0	0	0	0	0	0	0

Table 2. G.SHDSL Mode - NPar(2) coding

G.SHDSL NPar(2)s	8	7	6	5	4	3	2	1
G.SHDSL Initiate training mode (further information in Table 3)	x	x	0	0	0	0	0	1
G.SHDSL PMMS mode (further information in Table 3)	x	x	0	0	0	0	1	0
Reserved	x	x	0	0	0	1	0	0
Reserved	x	x	0	0	1	0	0	0
Reserved	x	x	0	1	0	0	0	0
Reserved	x	x	1	0	0	0	0	0
No parameters in this octet	x	x	0	0	0	0	0	0
Note: Only ONE value (i.e., Mode) can be selected.								

**Table 3. G.SHDSL Parameters - SPar(2) coding**

G.SHDSL SPar(2)s	8	7	6	5	4	3	2	1
G.SHDSL Initiate training (using downstream parameter values from Table 4 through Table 6.	x	x	x	x	x	x	x	1
G.SHDSL Initiate training (using upstream parameter values from Table 4 through Table 6.	x	x	x	x	x	x	1	x
G.SHDSL downstream PMMS using parameters in Table 5 through Table 7.	x	x	x	x	x	1	x	x
G.SHDSL upstream PMMS using parameters in Table 5 through Table 7.	x	x	x	x	1	x	x	x
Reserved	x	x	x	1	x	x	x	x
Reserved	x	x	1	x	x	x	x	x
No parameters in this octet	x	x	0	0	0	0	0	0
NOTE - more that one value can be selected in this Octet								

**Table 4. G.SHDSL general parameters - Octet 1- NPar(3) coding**

G.SHDSL training parameters - NPar(3)	8	7	6	5	4	3	2	1
G.SHDSL general parameter #1	x	x	x	x	x	x	x	1
G.SHDSL general parameter #2	x	x	x	x	x	x	1	x
G.SHDSL general parameter #3	x	x	x	x	x	1	x	x
G.SHDSL general parameter #4	x	x	x	x	1	x	x	x
G.SHDSL general parameter #5	x	x	x	1	x	x	x	x
Reserved	x	x	1	x	x	x	x	x
No parameters in this octet	x	x	0	0	0	0	0	0

**Table 5. G.SHDSL data rate octets - NPar(3) coding**

Data rate NPar(3)s	8	7	6	5	4	3	2	1
Octet 1 U = Unspecified by terminal R = Reserved for allocation by the ITU S = Transmit silence	x	x						U
Data rate (n * 64 kbit/s) n=			4	3		R	R	S
Octet 2 Data rate (n * 64 kbit/s) n=	x	x	10	9	8	7	6	5
Octet 3 Data rate (n * 64 kbit/s) n=	x	x	16	15	14	13	12	11
Octet 4 Data rate (n * 64 kbit/s) n=	x	x	22	21	20	19	18	17
Octet 5 Data rate (n * 64 kbit/s) n=	x	x	28	27	26	25	24	23
Octet 6 Data rate (n * 64 kbit/s) n=	x	x	34	33	32	31	30	29
Octet 7 Data rate (n * 64 kbit/s) n=	x	x					36	35
R = Reserved for allocation by the ITU-T T = 1.544 Mbit/s				R	R	R		
Octet 8 Sub Data rate (i * 8 kbit/s) i=	x	x	5	4	3	2	1	0
Octet 9 Sub Data rate (i * 8 kbit/s) i=	x	x					7	6
U = Unspecified by terminal R = Reserved for allocation by the ITU-T			R	R	R		U	
NOTE 1– During PMMS, Octet 8 = xx000001 <sub>2</sub> and Octet 9 = 00000000 <sub>2</sub>								
NOTE 2 – During PMMS, more than one bit can be set in Octet 1 through 7.								

**Table 6. G.SHDSL  $P_{ri}$ ,  $P_{ci}$  PBO parameter - Octet 3 - NPar(3) coding**

G.SHDSL PBO level - NPar(3) coding	8	7	6	5	4	3	2	1
Unspecified by terminal	x	x	0	0	0	0	0	0
PBO (dB) (bits 5-1 x 1.0 dB)	x	x	-	x	x	x	x	x
Reserved for allocation by the ITU-T	x	x	1	x	x	x	x	x

**Table 7. G.shdsl PMM segment duration octet**

Duration NPar(3)s	8	7	6	5	4	3	2	1
Unspecified by terminal	x	x	0	0	0	0	0	0
Duration (bits 6-1 x 50 ms)	x	x	x	x	x	x	x	x
Reserved for allocation by the ITU-T	x	x	1	1	1	1	1	1

**Table 8. PMMS – NT-032 parameter measurements procedure**

Transmit Unit	Name	#	Contents of octets
HSTU-R	MR-P	1	Table 1 x010 0000 (Select G.shdsl) Table 2 xx00 0010 (start PMMS measurements using set in Table 3) Table 3 xx00 0100 (downstream PMMS measurements using Table 5 through Table 7.) [ Table 5 xx00 0010 xx00 0010 xx00 0010 xx00 0010 xx00 0010 xx00 0010 xx00 0001 xx00 0000 [downstream]   Table 6 xx00 0010 (-2dB) [downstream] └ Table 7 xx00 0100 (200 ms) [downstream]
HSTU-C	MS	2	Table 1 x010 0000 (Select G.shdsl) Table 2 xx00 0010 (start PMMS measurements using set in Table 3) Table 3 xx00 1100 (downstream PMMS measurements using Table 5 through Table 7.) (upstream PMMS measurements using Table 5 through Table 7.) [ Table 5 xx00 0010 xx00 0010 xx00 0010 xx00 0010 xx00 0010 xx00 0010 xx00 0001 xx00 0000 [downstream]   Table 6 xx00 0010 (-2dB) [downstream] └ Table 7 xx00 0110 (300 ms) [downstream] [ Table 5 xx00 0010 xx00 0010 xx00 0010 xx00 0010 xx00 0010 xx00 0010 xx00 0001 xx00 0000 [upstream]   Table 6 xx00 0110 (-6dB) [upstream] └ Table 7 xx00 0100 (200 ms) [upstream]
HSTU-R	ACK	3	The message Acknowledges selection of PMMS
HSTU-R	PM <sub>RH</sub>	4	
HSTU-C	PM <sub>CH</sub>	5	
HSTU-R	MR-P	6	Table 1 x010 0000 (Select G.shdsl) Table 2 xx00 0001 (Initiate training (using parameter values from Table 3) Table 3 xx00 0001 (Initiate training (using downstream parameter values from Table 4 through Table 6.) [ Table 4 xxxx xxxx (some general parameters) [downstream]   Table 5 xx00 0000 xx00 0000 xx00 0010 xx00 0000 xx00 0000 xx00 0000 xx00 0010 xx00 0000 [downstream] └ Table 6 xx00 0110 (-6dB) [downstream]
HSTU-C	MS	7	Table 1 x010 0000 (Select G.shdsl) Table 2 xx00 0001 (Initiate training (using parameter values from Table 3) Table 3 xx00 0011 (Initiate training (using downstream parameter values from Table 4 through Table 6.)(using upstream parameter values from Table 4 and Table 6.) [ Table 4 xxxx xxxx (some general parameters) [downstream]   Table 5 xx00 0000 xx00 0000 xx00 0010 xx00 0000 xx00 0000 xx00 0000 xx00 0010 xx00 0000 [down/upstream] └ Table 6 xx00 0110 (-6dB) [downstream] [ Table 4 xxxx xxxx (some general parameters) [upstream] └ Table 6 xx00 0110 (-6dB) [upstream]
HSTU-R	ACK	8	The message Acknowledges selection of the G.SHDSL using the specified downstream (and upstream) PBO, data rate and other parameters.
-	Training	-	G.SHDSL training begins.

## 4. Alternative PMMS protocol encodings

Power Back Off measurements methods using enumerated sets of standard parameters sets (§4.1) or explicit parameters (§4.2) are described. .

### 4.1 Standard Parameter Set Method

This simple means of operation assumes that a standard set of parameters for both upstream and downstream measurement signal characteristics is being requested. This can substantially shorten the length of the messages. The HSTU-R selects a PMMS using “parameter set” mode by setting a specific NPar(2) bit. The parameters set is requested through a SPar(2) octet and a NPar(3) octet.

The contents of the MS messages are using G.shdsl as an example, but it can be used for any of the xDSL.. For the first (pre PMM) handshake transaction, the octet coding of the MR-P/MS messages is shown in Table 9 through Table 11 and Table 15. For the second (after PMM) handshake transaction, the octet coding of the MR-P/MS messages is shown in Table 9 through Table 11 and Table 12 through Table 14. The procedure with example contents is shown in Table 16.

**Table 9. Standard information field - SPar(1) coding**

SPar(1)s	8	7	6	5	4	3	2	1
G.992.1 - Annex A	x	x	x	x	x	x	x	1
G.992.1 - Annex B	x	x	x	x	x	x	1	x
G.992.1 - Annex C	x	x	x	x	x	1	x	x
G.992.2 - Annex A/B	x	x	x	x	1	x	x	x
G.992.2 - Annex C	x	x	x	1	x	x	x	x
G.SHDSL	x	x	1	x	x	x	x	x
Reserved	x	1	x	x	x	x	x	x
No parameters in this octet	x	0	0	0	0	0	0	0

**Table 10. G.SHDSL Mode - NPar(2) coding**

G.SHDSL NPar(2)s	8	7	6	5	4	3	2	1
G.SHDSL Initiate training	x	x	0	0	0	0	0	1
G.SHDSL PMMS initiate (measure using set # specified in Table 11)	x	x	0	0	0	0	1	0
Reserved	x	x	x	x	x	1	x	x
Reserved	x	x	x	x	1	x	x	x
Reserved	x	x	x	1	x	x	x	x
Reserved	x	x	1	x	x	x	x	x
No parameters in this octet	x	x	0	0	0	0	0	0

In Table 10, only ONE value (ie, Mode) can be selected.

**Table 11. G.SHDSL Parameters - SPar(2) coding**

G.SHDSL SPar(2)s	8	7	6	5	4	3	2	1
G.SHDSL Initiate training (using downstream parameter values from Table 12 through Table 13)	x	x	x	x	x	x	x	1
G.SHDSL Initiate training (using upstream parameter values from Table 12 through Table 13)	x	x	x	x	x	x	1	x
G.SHDSL downstream PMMS using set # from Table 15	x	x	x	x	x	1	x	x
G.SHDSL upstream PMMS using set # from Table 15	x	x	x	x	1	x	x	x
G.SHDSL downstream PMMS using explicit parameters in Table 17 and multiple copies of Table 18, Table 20, Table 21, and Table 22.	x	x	x	1	x	x	x	x
G.SHDSL upstream PMMS using explicit parameters in Table 17 and multiple copies of Table 18, Table 20, Table 21, and Table 22.	x	x	1	x	x	x	x	x
No parameters in this octet	x	x	0	0	0	0	0	0

Note - In Table 11, more than one value can be selected.

**Table 12. G.SHDSL general parameters - Octet 1- NPar(3) coding**

G.SHDSL training parameters - NPar(3)	8	7	6	5	4	3	2	1
G.SHDSL general parameter #1	x	x	x	x	x	x	x	1
G.SHDSL general parameter #2	x	x	x	x	x	x	1	x
G.SHDSL general parameter #3	x	x	x	x	x	1	x	x
G.SHDSL general parameter #4	x	x	x	x	1	x	x	x
G.SHDSL general parameter #5	x	x	x	1	x	x	x	x
Reserved	x	x	1	x	x	x	x	x
No parameters in this octet	x	x	0	0	0	0	0	0

**Table 13. G.SHDSL training parameters - Octet 2 - NPar(3) coding**

Data rate NPar(3)s	8	7	6	5	4	3	2	1
Unspecified by terminal	x	x	0	0	0	0	0	0
Data rate (bits 5-1 x 32 kbit/s)	x	x	0	x	x	x	x	x
Data rate (bits 5-1 x 64 kbit/s + 1024kbit/s)	x	x	1	x	x	x	x	x
Data rate 1.544 Mbit/s	x	x	1	1	1	1	1	0
Reserved for allocation by the ITU-T	x	x	1	1	1	1	1	1

**Table 14. G.SHDSL training parameters - Octet 3 - NPar(3) coding**

G.SHDSL PBO level - NPar(3) coding	8	7	6	5	4	3	2	1
PBO (dB) (bits 6-1 x 1dB)	x	x	x	x	x	x	x	x
Reserved	x	x	1	1	1	1	1	1



**Table 15. G.SHDSL PMMS initiate using set - NPar(3) coding**

G.SHDSL PMMS initiate - NPar(3)	8	7	6	5	4	3	2	1
G.SHDSL PMMS set #1 (1024 kbit/s; nominal power; 50ms; 5ms)	x	x	x	x	x	x	x	1
G.SHDSL PMMS set #2 (256 kbit/s; nominal power; 50ms; 5ms)	x	x	x	x	x	x	1	x
G.SHDSL PMMS set #3 (1024 kbit/s; -6dB power; 50ms; 5ms)	x	x	x	x	x	1	x	x
G.SHDSL PMMS set #4 (1024 kbit/s; -12dB power; 50ms; 5ms)	x	x	x	x	1	x	x	x
G.SHDSL PMMS set #4 (1024 kbit/s; -12dB power; 500ms; 50ms)	x	x	x	1	x	x	x	x
Reserved	x	x	1	x	x	x	x	x
No parameters in this octet	x	x	0	0	0	0	0	0

**Table 16. PMMS - standard parameter measurements procedure**

Transmit Unit	Name	#	Contents of octets
HSTU-R	MR-P	1	Table 9 x010 0000 (Select G.shdsl) Table 10 xx00 0010 (start PMMS measurements using set in Table 11) Table 11 xx00 0100 (downstream PMMS measurements using set in Table 15) Table 15 xx00 0001 (set #1) [downstream]
HSTU-C	MS	2	Table 9 x010 0000 (Select G.shdsl) Table 10 xx00 0010 (start PMMS measurements using set in Table 11) Table 11 xx00 1100 (downstream PMMS measurements using set in Table 15) (upstream PMMS measurements using set in Table 15) Table 15 xx00 0001 (set #1) [downstream] Table 15 xx00 0001 (set #1) [upstream]
HSTU-R	ACK	3	The message Acknowledges selection of PMMS
HSTU-C	PM <sub>CH</sub>	4	
HSTU-R	PM <sub>RH</sub>	5	
HSTU-R	MR-P	6	Table 9 x010 0000 (Select G.shdsl) Table 10 xx00 0001 (Initiate training (using parameter values from Table 11)) Table 11 xx00 0001 (Initiate training (using downstream parameter values from Table 13 through Table 14)) Table 12 xxxx xxxx General parameters [ Table 13 xx00 0010 (128 kbit/s) [downstream] ] Table 14 xx00 0110 (6 dB) [downstream]
HSTU-C	MS	7	Table 9 x010 0000 (Select G.shdsl) Table 10 xx00 0001 (Initiate training (using parameter values from Table 11)) Table 11 xx00 0011 (Initiate training (using downstream parameter values from Table 13 through Table 14) (using upstream parameter values from Table 13 through Table 14)) Table 12 xxxx xxxx General parameters [ Table 13 xx00 0010 (128 kbit/s) [downstream] ] Table 14 xx00 0110 (6 dB) [downstream] [ Table 13 xx00 0010 (128 kbit/s) [upstream] ] Table 14 xx00 0110 (6 dB) [upstream]
HSTU-R	ACK	8	The message Acknowledges selection of the G.SHDSL using the specified downstream (an upstream) PBO
-	Training	-	G.SHDSL training begins.

## 4.2 Explicit Parameters

Annex A of D.565 gave example encoding of duration, power, carrier selection of PMM signals composed of multiple tones. From agreement 7.3.4.2 of the G.shdsl issues list, the PMM signal for G.shdsl must be derived from the activation signals. Specifically, 2-PAM (§6.2.1/NT-R15) at a specific data/symbol rate will be used for G.shdsl training. In this section, some example encodings of G.shdsl activation data rates are proposed. For this contribution, we assume that there is a one-to-one correspondence between a given data rate and symbol rate, therefore we indicate "data rate" even though a training signal using the same symbol rate may transmit fewer bits/symbol.

The final resolution of G.shdsl data rates (and the corresponding spectrums) has not been decided yet, but agreements 4.2 and 4.2.1 give bounds and minimum resolution requirements. For this proposal, we assume a data rate resolution of 32 kbit/s upto 1Mbit/s and 64kbit/s above that, but other resolutions can be encoded in a similar manner. Table 18 shows how to encoded the minimum requirements of 192 kbit/sec to 2304 kbit/s with resolution of 64 kbit/s.

The PM<sub>RH</sub> and PM<sub>CH</sub> signals can contain multiple segments of signals. For example, several data rates for a given power level or several power levels for a given data can be sent to measure the PBO values. Thus each segment must be described with a "4-tuple" that consists of:

- Datarate
- Power level (from nominal)
- Duration
- Gaurd time (amount of silence after the signal before the next signal will be sent.)

The time duration were based on reasonable guesses obtained from observing the training durations and resolutions in Table 6-2/NT-R15. (20 ms minimum resolution, maximum duration of 5 seconds)

The octet coding of the MR-P and MS messages is shown in Table 9 through Table 11 and Table 17, through Table 22. The procedure with example contents is shown in Table 23

**Table 17. G.shdsl number of PMM segments octet**

PMM segments NPar(3)s	8	7	6	5	4	3	2	1
Unspecified by terminal	x	x	0	0	0	0	0	0
# segments (bits 6-1)	x	x	x	x	x	x	x	x
Reserved for allocation by the ITU-T	x	x	1	1	1	1	1	1

**Table 18. G.shdsl Data rate octet**

Data rate NPar(3)s	8	7	6	5	4	3	2	1
Unspecified by terminal	x	x	0	0	0	0	0	0
Data rate (bits 5-1 x 32 kbit/s)	x	x	0	x	x	x	x	x
Data rate (bits 5-1 x 64 kbit/s + 1024kbit/s)	x	x	1	x	x	x	x	x
Data rate 1.544 Mbit/s	x	x	1	1	1	1	1	0
Reserved for allocation by the ITU-T	x	x	1	1	1	1	1	1

**Table 19. Example values data rate encoding**

6	5	4	3	2	1	Result
0	0	0	0	0	0	Unspecified
0	0	0	1	1	0	$6 \times 32 = 192 \text{ kbit/s}$
0	1	1	1	1	1	$31 \times 32 = 992 \text{ kbit/s}$
1	0	0	0	0	0	$0 \times 64 + 1024 = 1024 \text{ kbit/s}$
1	0	0	0	1	1	$3 \times 64 + 1024 = 1216 \text{ kbit/s}$
1	1	1	1	0	1	$29 \times 64 + 1024 = 2880 \text{ kbit/s}$
1	1	1	1	1	0	1544 kbit/s
1	1	1	1	1	1	Reserved

**Table 20. G.shdsl power level octet**

G.SHDSL PBO level - NPar(3) coding	8	7	6	5	4	3	2	1
PBO (dB) (bits 6-1 x 1dB)	x	x	x	x	x	x	x	x
Reserved for allocation by the ITU-T	x	x	1	1	1	1	1	1

**Table 21. G.shdsl PMM segment duration octet**

Data rate NPar(3)s	8	7	6	5	4	3	2	1
Duration (bits 5-1 x 20 ms)	x	x	0	x	x	x	x	x
Duration (bits 5-1 x 100ms + 700ms)	x	x	1	x	x	x	x	x
Reserved for allocation by the ITU-T	x	x	1	1	1	1	1	1

**Table 22. G.shdsl PMM segment guard octet**

Data rate NPar(3)s	8	7	6	5	4	3	2	1
Duration (bits 6-1 x 5 ms)	x	x	x	x	x	x	x	x
Reserved for allocation by the ITU-T	x	x	1	1	1	1	1	1

**Table 23. PMMS - explicit measurements procedure for PMXH with four segments each**

Transmit Unit	Name	#	Contents of octets
HSTU-R	MR-P	1	<p>Table 9 x010 0000 (Select G.shdsl)</p> <p>Table 10 xx00 0010 (start PMMS measurements using set in Table 11)</p> <p>Table 11 xx01 0000 (downstream PMMS measurements using explicit parameters in Table 17 and multiple copies of Table 18, Table 20, Table 21, and Table 22)</p> <p>Table 17 xx00 0011 Number of segments [downstream] (eg: 3)</p> <p>[ Table 18 xx10 0000 Data rate [downstream] (eg: 1024 kbit/s)</p> <p>  Table 20 xx00 1010 Power level [downstream] (eg: -10dB)</p> <p>  Table 21 xx00 0001 Duration [downstream,] (eg: 20 ms)</p> <p>└ Table 22 xx00 0100 Guard [downstream] (eg: 20 ms)</p> <p>[ Table 18 xx10 0000 Data rate [downstream] (eg: 1024 kbit/s)</p> <p>  Table 20 xx01 0100 Power level [downstream] (eg: -20dB)</p> <p>  Table 21 xx00 1010 Duration [downstream,] (eg: 200 ms)</p> <p>└ Table 22 xx00 0100 Guard [downstream] (eg: 20 ms)</p> <p>[ Table 18 xx00 1000 Data rate [downstream] (eg: 256 kbit/s)</p> <p>  Table 20 xx00 1010 Power level [downstream] (eg: -10dB)</p> <p>  Table 21 xx00 0001 Duration [downstream,] (eg: 20 ms)</p> <p>└ Table 22 xx00 0001 Guard [downstream] (eg: 20 ms)</p>
HSTU-C	MS	2	<p>Table 9 x010 0000 (Select G.shdsl)</p> <p>Table 10 xx00 0010 (start PMMS measurements using set in Table 11)</p> <p>Table 11 xx11 0000 (downstream and upstream PMMS measurements using explicit parameters in Table 17 and multiple copies of Table 18, Table 20, Table 21, and Table 22)</p> <p>Table 17 xx00 0011 Number of segments [downstream] (eg: 3)</p> <p>[ Table 18 xx10 0000 Data rate [downstream] (eg: 1024 kbit/s)</p> <p>  Table 20 xx00 1010 Power level [downstream] (eg: -10dB)</p> <p>  Table 21 xx00 0001 Duration [downstream,] (eg: 20 ms)</p> <p>└ Table 22 xx00 0100 Guard [downstream] (eg: 20 ms)</p> <p>[ Table 18 xx10 0000 Data rate [downstream] (eg: 1024 kbit/s)</p> <p>  Table 20 xx01 0100 Power level [downstream] (eg: -20dB)</p> <p>  Table 21 xx00 1010 Duration [downstream,] (eg: 200 ms)</p> <p>└ Table 22 xx00 0100 Guard [downstream] (eg: 20 ms)</p> <p>[ Table 18 xx00 1000 Data rate [downstream] (eg: 256 kbit/s)</p> <p>  Table 20 xx00 1010 Power level [downstream] (eg: -10dB)</p> <p>  Table 21 xx00 0001 Duration [downstream,] (eg: 20 ms)</p> <p>└ Table 22 xx00 0001 Guard [downstream] (eg: 20 ms)</p> <p>Table 17 xx00 0001 Number of segments [upstream] (eg: 1)</p> <p>[ Table 18 xx10 0000 Data rate [upstream] (eg: 1024 kbit/s)</p> <p>  Table 20 xx00 1010 Power level [upstream] (eg: -10dB)</p> <p>  Table 21 xx00 0001 Duration [upstream,] (eg: 20 ms)</p> <p>└ Table 22 xx00 0100 Guard [upstream] (eg: 20 ms)</p>
HSTU-R	ACK	3	The message Acknowledges selection of PMMS
HSTU-C	PM <sub>CH</sub>	4	
HSTU-R	PM <sub>RH</sub>	5	
HSTU-R	MR-P	6	(same as example in Table 16)
HSTU-C	MS	7	(same as example in Table 16)
HSTU-R	ACK	8	The message Acknowledges selection of the G.SHDSL using the specified downstream (an upstream) PBO
-	Training	-	G.SHDSL training begins.

## **5. Summary**

1. Agenda Area: This should be presented in the discussion on G.shdsl pre-activation (issues 4.11 and 7.3 of the G.shdsl Issues list in NT-U15R1).
2. Expectations:
  - Acceptance of the proposed encodings.

The detailed examples that were presented in D.565 and NG-103 should also be considered in any discussion on this subject.