



***Society of Cable
Telecommunications
Engineers***

ENGINEERING COMMITTEE
Hybrid Management Sub-Layer Subcommittee

AMERICAN NATIONAL STANDARD

ANSI/SCTE 25-1 2008

**Hybrid Fiber Coax Outside Plant Status Monitoring –
Physical (PHY) Layer Specification v1.**

NOTICE

The Society of Cable Telecommunications Engineers (SCTE) Standards are intended to serve the public interest by providing specifications, test methods and procedures that promote uniformity of product, interchangeability and ultimately the long term reliability of broadband communications facilities. These documents shall not in any way preclude any member or non-member of SCTE from manufacturing or selling products not conforming to such documents, nor shall the existence of such standards preclude their voluntary use by those other than SCTE members, whether used domestically or internationally.

SCTE assumes no obligations or liability whatsoever to any party who may adopt the Standards. Such adopting party assumes all risks associated with adoption of these Standards, and accepts full responsibility for any damage and/or claims arising from the adoption of such Standards.

Attention is called to the possibility that implementation of this standard may require the use of subject matter covered by patent rights. By publication of this standard, no position is taken with respect to the existence or validity of any patent rights in connection therewith. SCTE shall not be responsible for identifying patents for which a license may be required or for conducting inquiries into the legal validity or scope of those patents that are brought to its attention.

Patent holders who believe that they hold patents which are essential to the implementation of this standard have been requested to provide information about those patents and any related licensing terms and conditions. Any such declarations made before or after publication of this document are available on the SCTE web site at <http://www.scte.org>.

All Rights Reserved

© Society of Cable Telecommunications Engineers, Inc. 2008

140 Philips Road

Exton, PA 19341

TABLE OF CONTENTS

LIST OF FIGURES	3
LIST OF TABLES	4
DOCUMENT HISTORY	5
1.1 SCOPE	5
1.2 TRANSPONDER TYPE CLASSIFICATIONS	5
1.3 HMS REFERENCE ARCHITECTURE FORWARD AND RETURN CHANNEL SPECIFICATIONS	7
1.4 HMS SPECIFICATION DOCUMENTS	8
1.5 FUNCTIONAL ASSUMPTIONS	9
1.5.1 <i>Forward and Return Spectrum</i>	9
1.5.2 <i>Transmission Levels</i>	9
2 PHYSICAL LAYER SPECIFICATION	10
2.1 SEPARATE FORWARD AND RETURN CHANNELS	10
2.2 SINGLE FORWARD AND RETURN PATH CHANNELS	10
2.3 BYTE-BASED TRANSMISSION.....	10
2.4 BYTE FORMATS AND TRANSMISSION ORDER	10
2.5 PACKET-BASED TRANSMISSION.....	11
2.6 DUPLEX OPERATION	11
2.7 FORWARD AND RETURN CHANNEL SPECIFICATIONS.....	11
2.7.1 <i>Transmit Power Level</i>	13
2.7.2 <i>Transmit Power Accuracy</i>	14
2.7.3 <i>Transmit Power Step Size</i>	14
2.7.4 <i>Transmitter Frequencies</i>	14
2.7.5 <i>Transmitter Frequency Step Size</i>	14
2.7.6 <i>Transmitter Frequency Accuracy</i>	14
2.7.7 <i>Transmitter Conducted Spurious</i>	14
2.7.8 <i>Spectral Shape</i>	14
2.7.9 <i>Transmitter Out-of-Band Noise Suppression</i>	15
2.7.10 <i>Transmit Nominal Impedance</i>	15
2.7.11 <i>Transmit Return Loss</i>	15
2.7.12 <i>Maximum Ramp-Up Time</i>	15
2.7.13 <i>Maximum Ramp-Down Time</i>	15
2.7.14 <i>Transmitter Front Porch Time</i>	16
2.7.15 <i>Receive Power Dynamic Range</i>	16
2.7.16 <i>Receive Tuning Range</i>	16
2.7.17 <i>Receiver Frequency Step Size</i>	16
2.7.18 <i>Receive C/(N+I)</i>	16
2.7.19 <i>Receiver Selectivity</i>	17
2.7.20 <i>Receive Nominal Impedance</i>	17
2.7.21 <i>Receive Return Loss</i>	17
2.7.22 <i>Transmitter Slew Rate</i>	17

2.7.23	<i>Transmitter On/Off Ratio</i>	18
2.7.24	<i>Modulation Technique</i>	18
2.7.25	<i>Bit Rate</i>	18
2.7.26	<i>Bit Rate Accuracy</i>	18
2.7.27	<i>Transmitter Power Delta Between ‘Mark’ and ‘Space’</i>	18
2.7.28	<i>Transmission Duplexing</i>	18
2.7.29	<i>Transmission Mode</i>	18
2.7.30	<i>RF Connector</i>	18
2.7.31	<i>Operating Temperature Range</i>	19
2.8	MEDIA ACCESS CONTROL LAYER INTERFACE	19
2.9	RF CUTOFF	19
REFERENCES		20
3 NORMATIVE REFERENCES		20
APPENDIX A. GLOSSARY		21
APPENDIX B. LIST OF ACRONYMS		23

LIST OF FIGURES

FIGURE 1: HMS REFERENCE ARCHITECTURE DIAGRAM	7
FIGURE 2: BIT TRANSMISSION ORDER	11

LIST OF TABLES

TABLE 1: TRANSPONDER TYPE CLASSIFICATIONS	6
TABLE 2: HMS DOCUMENT FAMILY	8
TABLE 3: SPECTRAL LIMITS BY GEOGRAPHICAL AREA	9
TABLE 4: HMS PHY CHANNEL RF AND MODULATION SPECIFICATIONS	12

Introduction

The Hybrid Fiber Coax (HFC) Outside Plant (OSP) Physical (PHY) Layer Specification is part of the suite of specifications developed by the Hybrid Management Sub-Layer (HMS) subcommittee under the SCTE. The purpose of the HMS specifications is to support the design and implementation of interoperable management systems for evolving HFC cable networks. The HMS Physical (PHY) Layer Specification describes the physical layer portion of the protocol stack used for communication between HMS-compliant transponders interfacing to manage outside plant network elements (NE) and a centralized headend element (HE).

1.1 Scope

This specification describes the PHY layer requirements that must be implemented by all *Type 2* and *Type 3* compliant OSP HMS transponders on the HFC plant and the controlling equipment in the headend. Any exceptions to compliance with this specification will be specifically noted in this document as necessary. Refer to **Table 1** for a full definition of the Type Classifications.

Note

Electromagnetic Compatibility (EMC) is not specified in this standard and is left to the vendor to ensure compliance with local EMC regulatory requirements. Other than operating temperature, physical parameters such as shock, vibration, humidity, etc., are also not specified and left to the vendor's discretion.

1.2 Transponder Type Classifications

Transponder type classifications referenced within the HMS suite of specifications are defined in **Table 1**.

Table 1: Transponder Type Classifications

Type	Description	Application
<i>Type 0</i>	Refers to legacy transponder equipment which is incapable of supporting the HMS specifications.	• This transponder interfaces with legacy network equipment through proprietary means. • This transponder could be managed through the same management applications as the other types through proxies or other means at the headend.
<i>Type 1</i>	Refers to stand-alone transponder equipment (legacy or new) which can be upgraded to support the HMS specifications.	• This transponder interfaces with legacy network equipment through proprietary means. • Type 1 is a standards-compliant transponder (either manufactured to the standard or upgraded) that connects to legacy network equipment via a proprietary interface.
<i>Type 2</i>	Refers to a stand-alone, HMS-compliant transponder.	• This transponder interfaces with network equipment designed to support the electrical and physical specifications defined in the HMS standards. • It can be factory or field-installed. • Its RF connection is independent of the monitored NE.
<i>Type 3</i>	Refers to a stand-alone or embedded, HMS-compliant transponder.	• This transponder interfaces with network equipment designed to support the electrical specifications defined in the HMS standards. • It may or may not support the physical specifications defined in the HMS standards. • It can be factory-installed. It may or may not be field-installed. • Its RF connection is through the monitored NE.