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**Modular Headend Architecture Part 7:
EQAM Architectural Overview Technical Report**

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1 SCOPE

NOTE: This document is identical to SCTE 137-7 2010 except for informative components which may have been updated such as the title page, NOTICE text, headers and footers. No normative changes have been made to this document.

1.1 Introduction and Purpose

This Architectural Overview Technical Report is intended to provide an introduction to the Modular Headend Architecture, with particular emphasis on the EQAM as a key component. This document describes the various architectural entities and the interfaces that connect them, provides an overview of the various profiles of EQAM devices and their operations, and discusses the various specifications that contain normative requirements pertaining to the Modular Headend Architecture.

1.2 Requirements and Conventions

This document is intended to be completely informative. However, this document will reference and discuss other relevant specifications that contain normative requirements.

2 REFERENCES

All standards are subject to revision, and users of this document are encouraged to investigate the possibility of applying the most recent editions of the documents listed below.

2.1 Informative References

This technical report uses the following informative references.

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- [SCTE 137-6] SCTE 137-6 2010, Modular Headend Architecture Part 6: Edge QAM Video Stream Interface.
- [T1.101] ANSI/ATIS 0900101.2006, Synchronization Interface Standard, Alliance for Telecommunication Industry Solutions, November 2006.

2.2 Reference Acquisition

- Alliance for Telecommunications Industry Solutions, ATIS, 1200 G Street NW, Suite 500 | Washington, DC, 20005, Phone +1-202.628.6380, Fax +1-202.393.5453, <http://www.atis.org/>
- European Telecommunications Standards Institute, ETSI, 650, route des Lucioles, 06921 Sophia-Antipolis Cedex, France, Phone +33 (0)4 92 94 42 00, Fax +33 (0)4 93 65 47 16, <http://www.etsi.com/>
- International Telecommunication Union - Telecommunication Standardization Sector (ITU-T), <http://www.itu.int/itu-t/>
- Internet Engineering Task Force (IETF) Secretariat, 46000 Center Oak Plaza, Sterling, VA 20166, Phone +1-571-434-3500, Fax +1-571-434-3535, <http://www.ietf.org>
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3 TERMS AND DEFINITIONS

This document uses the following terms:

Edge QAM	A head-end or hub device that receives packets of digital video or data from the operator network. It re-packetizes the video or data into an MPEG transport stream and digitally modulates the transport stream onto a downstream RF carrier using QAM.
Edge Resource Manager	A network element that manages the input and output resources of an EQAM via the protocols defined in this specification.
Cable Modem Termination System	A headend component that provides the operator network side termination for the DOCSIS link. A CMTS communicates with a number of Cable Modems to provide data services.
Cable Modem	A customer premises component that provides the customer network side termination for the DOCSIS link. A CM communicates with a Cable Modem Termination System to provide data services.
Switched Digital Video	A bandwidth efficient digital video service that utilizes two-way signalling between a Session Manager in the headend and the set-top box in the customer premises in order to deliver only the programs that are currently being actively received/viewed by customers.
Video On Demand	A digital video service that utilizes two-way signalling between a Session Manager in the headend and the set-top box in the customer premises in order to stream a particular video asset to that customer.
Session Manager	A headend component of the digital video infrastructure that communicates with set-top boxes in order to establish and to teardown Video On Demand and Switched Digital Video sessions.
Narrowcast	A service that provides a unique data stream intended to reach a small number of customers. Switched Digital Video, Video on Demand, and DOCSIS are all considered to be narrowcast services.
Service Group	An HFC service group (also known as a service group) is a portion of an HFC access network used to deliver a set of services to a population of cable modems or set-top boxes that share a common spectrum of RF channels.

4 ABBREVIATIONS AND ACRONYMS

This document uses the following abbreviations:

ATM	Asynchronous Transfer Mode
A/V	Audio/Video
CIN	Converged Interconnect Network
CM	Cable Modem
CMCI	Cable Modem Customer Interface
CMTS	Cable Modem Termination System
CPE	Customer Premises Equipment
DEPI	Downstream External PHY Interface
DHCP	Dynamic Host Configuration Protocol
DOCSIS®	Data-Over-Cable Service Interface System
DRFI	Downstream Radio Frequency Interface
DTI	DOCSIS Timing Interface
EQAM	Edge Quadrature Amplitude Modulator
ERM	Edge Resource Manager
ERMI	Edge Resource Manager Interface
HDLC	High-level Data Link Control
HFC	Hybrid Fiber Coax
IGMP	Internet Group Management Protocol
IP	Internet Protocol
L2TPv3	Layer-2 Transport Protocol Version 3
MPTS	Multiple Program Transport Stream
M-CMTS	Modular Cable Modem Termination System
MAC	Media Access Control
MPEG	Motion Pictures Experts Group
NMS	Network Management System
NSI	Network System Interface
OSS	Operations Support System
OSSI	Operations Support System Interface
PCR	Program Clock Reference
PHY	Physical Layer
PPP	Peer-to-Peer Protocol
PSP	Packet Streaming Protocol
QAM	Quadrature Amplitude Modulation
RF	Radio Frequency
RFC	Request For Comments
RTSP	Real Time Streaming Protocol
S-CDMA	Synchronous Code Division Multiple Access
S/W	Software

SDV	Switched Digital Video
SM	Session Manager
SNMP	Simple Network Management Protocol
SPTS	Single Program Transport Stream
STB	Set-top box
TFTP	Trivial File Transfer Protocol
TSID	Transport Stream Identifier
UDP	User Datagram Protocol
VOD	Video On Demand
XML	Extensible Markup Language

5 REFERENCE ARCHITECTURE

Two reference architectures are provided in this section, one showing the digital video delivery infrastructure including video EQAMs, and the other showing the high-speed data infrastructure that includes M-CMTS EQAMs. While not explicitly shown, it is expected that the majority of MSO systems will provide both services, and even that some EQAMs will be involved in providing both services. EQAMs that are capable of delivering both digital video and DOCSIS data are referred to as Universal EQAMs.

5.1 Video Headend Reference Architecture

Cable headends acquire video from various sources to be provided to the subscriber via the HFC network. Continuously broadcast programs delivered as either analog or digital channels may feed the HFC network directly. Some linear broadcast programs may be provided as IP unicast MPEG transport streams requiring processing via an Edge QAM device in order to be continually broadcast out to the service group. Some channels may be provided as IP multicast MPEG transport streams to be only sent to service groups as needed. Finally, some video may be sourced within the headend in the form of IP unicast MPEG transport streams by video stream servers that support applications such as VOD and targeted advertising. In Figure 5-1, the dotted lines represent the video data. The remainder of the diagram represents control elements or flows within the video system.

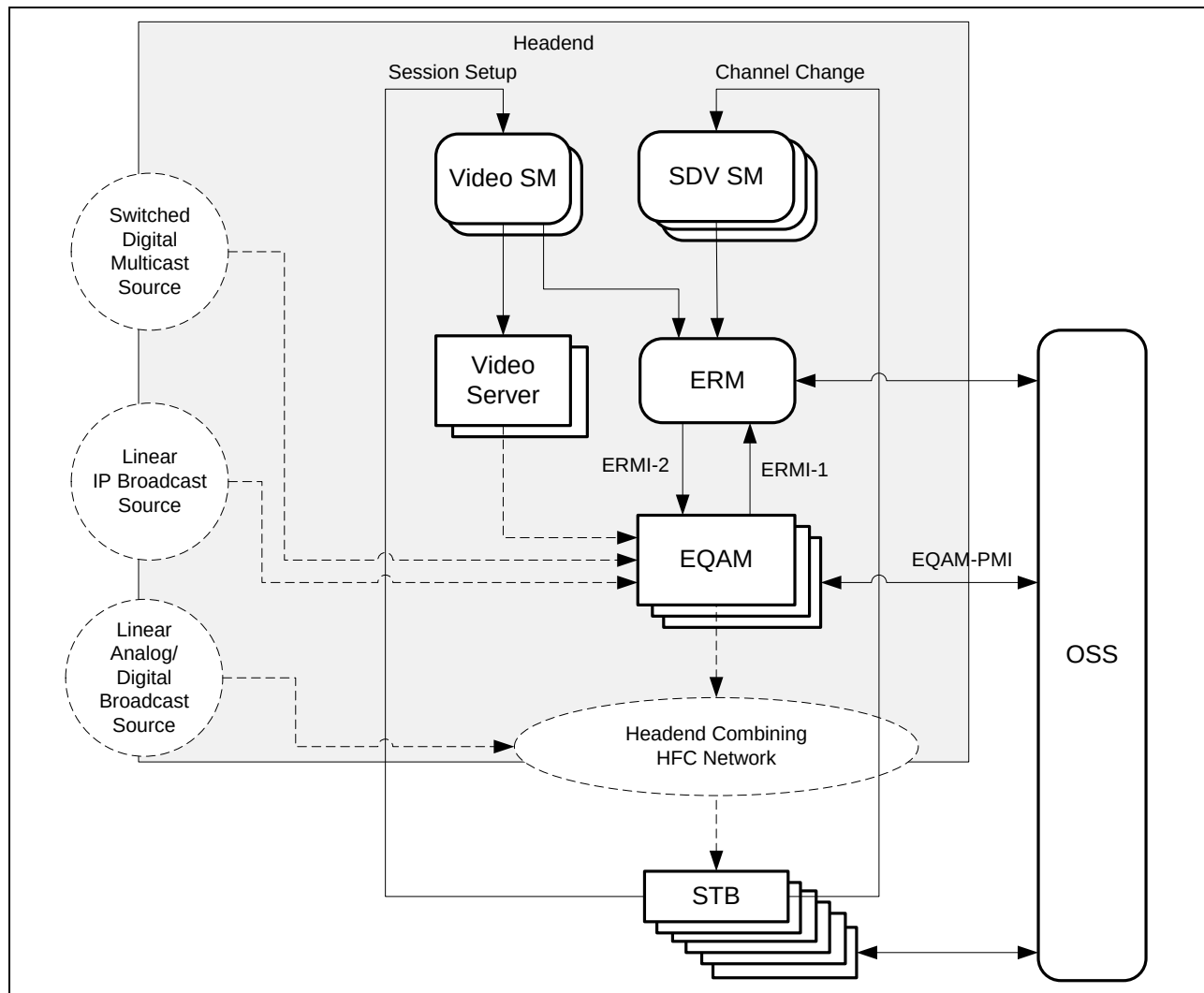


Figure 5-1 - Video Headend Reference Architecture