Edge-QAM, for broadcast video and VOD applications

The Teleste Virtuoso is a unique class of edge network device that enables delivery of digital video content in a very dense, redundant, modular, and cost-effective package. Unique, as well, is its expandibility to Modular Cable Modem Termination System (M-CMTS™) compliance for simultaneous delivery of DOCSIS downstream data and Digital Video content.

The Teleste Virtuoso is a unique class of edge network device that enables delivery of digital video content in a very dense, redundant, modular, and cost-effective package. Unique, as well, is its expandibility to Modular Cable Modem Termination System (M-CMTS™) compliance for simultaneous delivery of DOCSIS downstream data and Digital Video content.

The operator is, therefore, saved from the capital and operational expense burden of having to replace or retrofit their non-compliant Edge QAMs when transitioning to a M-CMTS architecture. Additionally, the Virtuoso supports broadcast digital programming being injested as either SPTS' or MPTS'. Passthru and Remultiplex options are supported. Included in this support is specialized DVB-SI table handling and DVB Simulcrypt scrambling as well.

Edge QAMs are an integral part of an operator's HFC infrastructure that supplies digital broadcast and Video on Demand (VoD) services to their subscribers. As the penetration and concurrence of digital video and VoD increases, so does the need for additional QAM streams in a dense and space-saving package. Operators are looking for the next generation of Edge QAMs to support additional features, flexibility, and functionality while still maintaining very attractive cost targets. Additionally, video transport in the metro fiber-based systems is moving rapidly from Asynchronous Serial Interface (ASI) to Gigabit Ethernet (GbE) to lower costs, extend distance, and increase maneuverability.

The Virtuoso is designed to efficiently and economically address both video Edge QAM requirements and, in conjunction with other M-CMTS network elements, downstream-biased DOCSIS market segments in one flexible solution that can evolve with the operator's needs.

As an Edge QAM device, the Virtuoso is designed to link MPEG-2 SPTS and MPTS streams from IP-based Gigabit Ethernet metro networks to QAM-based HFC networks.

The Virtuoso platform can ingest up to 624 simultaneous MPEG-2 transport streams (single or multiple) via any of its four GbE interfaces and flexibly multiplex them across any of its available output channels.

Traditional MPEG-2 functions such as PSI table insertion, automatic PID re-mapping, PCR re-stamping, and DVB Simulcrypt / common scrambling (CS) are supported. The Virtuoso supports highly dense QAM output configurations with capacity for up to 48 QAM channels in a 2RU chassis. The Virtuoso has six QAM card slots and each QAM card supports up to eight QAM channels, thus affording the operator population flexibility for growth and no stranded capacity.

The Virtuoso will also support DOCSIS downstream traffic when deployed as part of an M-CMTS solution. It can deliver DOCSIS and video streams on the same QAM channel, maintaining all of the rich Edge QAM functionality for delivery of digital video services. The Virtuoso can, therefore, be used today as an enhanced Edge QAM solution and migrate unobtrusively over time to the next-generation of edge devices that will require convergence with high-speed data delivery services.

Features

- AM Density — up to 48 QAM channels in a single chassis
- Investment Protection thru modular design supports current digital video processing needs as well as a simple transition solution to next-generation services such as M-CMTS & DOCSIS 3.0
- Video stream density with a peak capacity of 624 simultaneous CBR video streams
- Unmatched Redundancy for WAN, power, RF, fans, & internal switching fabric
- Pay as you grow — modularity supports from 8 to 48 QAM channels for Video-on-Demand and Broadcast Digital programming ingested across up to 4 Gigabit Ethernet interfaces
- Broadcast Digital Programming Support
- Bonded QAM channel design allows for a migratory path to wideband data solutions such as DOCSIS 3.0
- DVB Simulcrypt support
- Supports switched digital video

Technical specifications

WAN Module:

Standard Gigabit Ethernet input interfaces	4
Maximum aggregate input rate	2.8 Gbps
Optical SFP or 1000BaseT options	IEEE802.3z or IEEE802.3ab
Gigabit Ethernet Redundancy	2X (1 + 1), 2+1, 3+1
IP Unicast and Multicast	(IGMPv1/2/3)
UDP encapsulated packets	1 to 7
Flexible stream routing options through UDP port mapping and IP address	

QAM Module:

External "F" type female connectors, 75 ohm	(ISO-169-24)
4 block-converted adjacent channels per RF output port	
2 RF output ports per module	
ITU-T J.83 Annex A, B, C Support	
Center-tuned Frequency Range	57-867 MHz
Minimum Frequency Step	13.8 kHz
Modulation Type 64, 128 and 256 QAM	
Power Per Channel N=1	52 to 60 dBmV
Power Per Channel N=2	48 to 56 dBmV
Power Per Channel N=4	44 to 52 dBmV
Power Level Step Size	0.2 dB
Output Return loss (active ch. 88-750MHz)	> 14 dB
Output Return loss (active ch. 750MHz-870MHz)	> 13 dB
Output Return loss (inactive ch.l)	> 12 dB
MER (equalized) > 43 dB	
MER (un-equalized) > 35 dB	
Single, Dual, Quad carriers per RF output port	
RF block muting	
Max. aggregate output rate (Annex A/256QAM)	2.3 Gbps

Control Interfaces:

Two independent 10/100BaseTX	for CAS and management
RS-232 Serial Port Debug console connection	

Protocols:

SNMP, XML, HTTP, CLI (telnet/ssh, RS232), TFTP
In-band or out-of-band management
Ethernet test/loop port for external analysis of any MPTS
GUI-based Nodal Management System

MPEG Processing:

Receive up to 1488 MPEG2 SPTS input streams (RFC768)	
Generate up to 48 MPTS output streams	(ISO/IEC 13818-1)
MPTS and SPTS passthru and remultiplex	
PID filtering/remapping when required	(automatic handling)
Stream Replication to multiple QAM outputs	
Support for up to 63 SPTS per QAM channel	
Input jitter (Standard Def. peak to peak)	up to 250 msec
Re-multiplexing/routing	any input stream to any output
PCR de-jittering and re-stamping of input streams	
PSI processing	autom. generation PAT, PMT, CAT
DVB-SI table multiplexing from external SI generators	
Internal DVB-SI table insertion	
DVB simulcrypt scrambling	

General:

Field-upgradeable software download support	(compact flash)
Front panel LCD display	4 line alpha-numeric w/ keypad control
Hot-swappable, field-upgradeable 8-slot modular design	
Redundancy	Power, Gigabit Ethernet, Fans, QAMS
Future Field Upgradeable	M-CMTS, DOCSIS 3.0
Electrical/ Mechanical:	
Input Voltage	100-240 VAC, 50-60 Hz
Input Voltage	-42 to -56 VCD
Maximum Power Consumption (fully loaded)	< 320 watts
Dimensions (H x W x D)	8.9 x 48 x 61 cm
	(3.5"x19"x24" in)
Full-fill Weight	22.7 kg

Environmental:

Operating Temperature	0 ... 50 ºC Ambient
Storage Temperature -	40 to 70 ºC
Relative Humidity	up to 90% (Non-condensing)

PIP107E_v2.0_08/2008