



# LUMINATO 4X4 edgeQAM Introduction

Teleste Corporation, 22<sup>nd</sup> June, 2023

# Luminato 4X4 edgeQAM: Agenda

- Why Luminato 4X4 edgeQAM ?
- Technical highlights
- Management and monitoring
- Encryption
- System examples
- High availability
- Support (Teleste CARE)
- Success stories

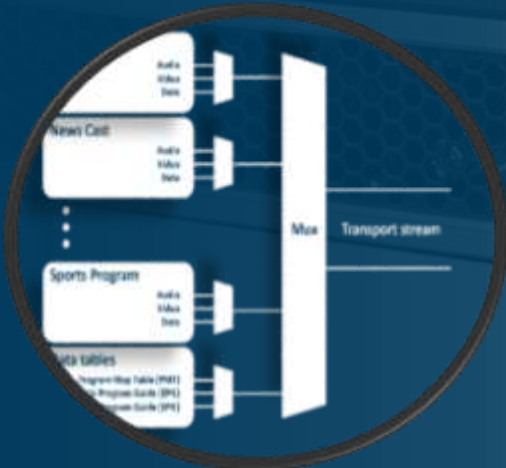


# Why Luminato 4X4 edgeQAM ?

- Perfect replacement<sup>\*)</sup> for
  - Synamedia (Cisco) RF Gateway 1 (RFGW1)
  - Harmonic NSG9000
  - Commscope (Arris) D5
  - Mediakind (Ericsson) EQ8096
  - Other broadcast edgeQAM
- Quick and easy configuration and system setup
- Robust and reliable operation to ensure carefree maintenance
- Teleste Argus to manage the whole network edgeQAMs centrally with mass operations options
- 24/7 support available (Teleste CARE)
- Flexible output channel configuration to match any line-up
- Versatile operation modes enable the most optimized adaptation to each network
- More QAMs per module simplifies combiner field unless even remove the need of it

<sup>\*)</sup> Luminato 4X4 is not one on one replacement but brings advanced features making the mangament of the network and devices smoother and easier then ever

# Luminato 4X4 edgeQAM: technical highlights



# Luminato 4X4 edgeQAM platform – in brief

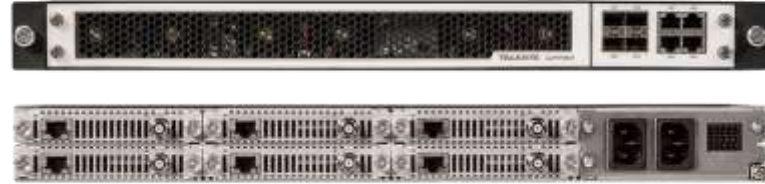


- Platform designed and optimized for broadcast edgeQAM use
  - New HW design (2020), ready for the next 10 years
  - SW design based on the continuous development during the last 15 years → proven stability
  - OS and cyber security updated
- Over 12000 Luminato chassis sold and > 1000 edgeQAM systems used globally
- High reliability, failure rate < 0.3%, MTBF > 1500 years
- Low power consumption, e.g. ~ 2 W per QAM
- Versatile management options: WebUI, CLI, API
- Central management with mass operations options by Teleste Argus
- Integrated to many different management systems using SNMP and/or API
- Made in Finland, Finished by Finns



## Luminato 4X4 edgeQAM – feature highlights

- **Network interfaces with flexible configuration**
  - 4 x 10 GigE SFP+ interfaces
  - 4 x 1 GigE electrical interfaces
- **2 pcs power supply slots inside chassis 100 ... 240 V AC, -48 V DC**
- **6 slots for denseQAM modules**
- **6 pcs high performance / endurance fans ensure proper cooling**
- **Hot swappable PSUs, modules, fans**
- **DVB-CSA simulcrypt and AES encryption with over 30 different CA systems supported**
- **DVB PSI/SI and ATSC PSIP tables supported**
- **Versatile redundancy options: PSU, input stream redundancy, 1+1 HW redundancy, N+1 in-chassis module redundancy**



# Dense Modulator highlights

**Payload input: 4 Gbps + 1 Gbps (module GE port)**  
**output: total 3.2 Gbit/s shared with chassis and module GE port**

**1024 IP input UDP/RTP streams**

**Up to 32 multiplexers with up to 120 inputs in each**

**Up to 32 frequency agile QAM modulators**

**Up to 2 x 32 IP outputs for mirroring of QAM multiplexes**

**DVB-C and J.83 Annex B modulations supported**

**Encryption (DVB-CSA, AES) with over 30 different CA systems**

**RF output frequency range 85 ... 900 MHz, 100 ... 1000 MHz**

**MER > 45 dB**

**Up to 110 dBuV RF output level to comply Cable Labs requirements**



# Management and monitoring



# Luminato 4X4 – management interfaces

- **Graphical user interface based on web browser usage (WebUI)**
  - Intuitive usability
  - Configuration based on drag & drop
  - Versatile configuration options
  - Realistic view to module composition
- **CLI text based configuration over SSH**
  - Powerful and straight forward commands with auto complete option
  - Online help available
- **API for integration of 3<sup>rd</sup> party software (M2M communication)**
  - REST interface with JSON for transferring data



Company restricted

# Luminato 4X4 edgeQAM – management & monitoring

- **Teleste CATVisor Argus**

- Individual configuration using WebUI
- Mass configuration of all or selected devices in the network
  - Configuration uploads
  - Software upgrades
  - License upgrades
  - 1+1 handovers main → backup → main
- Monitoring over SNMP
  - Intelligent event and trap management
  - Spatial view to visualize network structure and headend composition
  - Real-time measured information of the devices available
  - Customisable views and workspaces



# Luminato 4X4 edgeQAM – management & monitoring

- **Skyline Dataminer**
  - Individual appliance configuration using WebUI
  - Monitoring over SNMP
- **Zabbix open source monitoring solution**
  - Monitoring over SNMP
- **Zenoss intelligent application monitoring**
  - Monitoring over SNMP

# Encryption



# Luminato 4X4 edgeQAM encryption – technical highlights

- **The best encryption performance on the market**
- **Over 30 different CAS systems supported (see next slide)**
- **DVB-CSA v1 / v2 and AES (CBC, ECB 1/2, CTR, IDSA) algorithms in use**
  
- **Scrambling performance highlights:**
  - **Up to 10 simultaneous CAS connections**
  - **4320 ECMs per chassis**
  - **2160 ECMs per denseQAM module**
  - **10 Mbps EMM bandwidth**

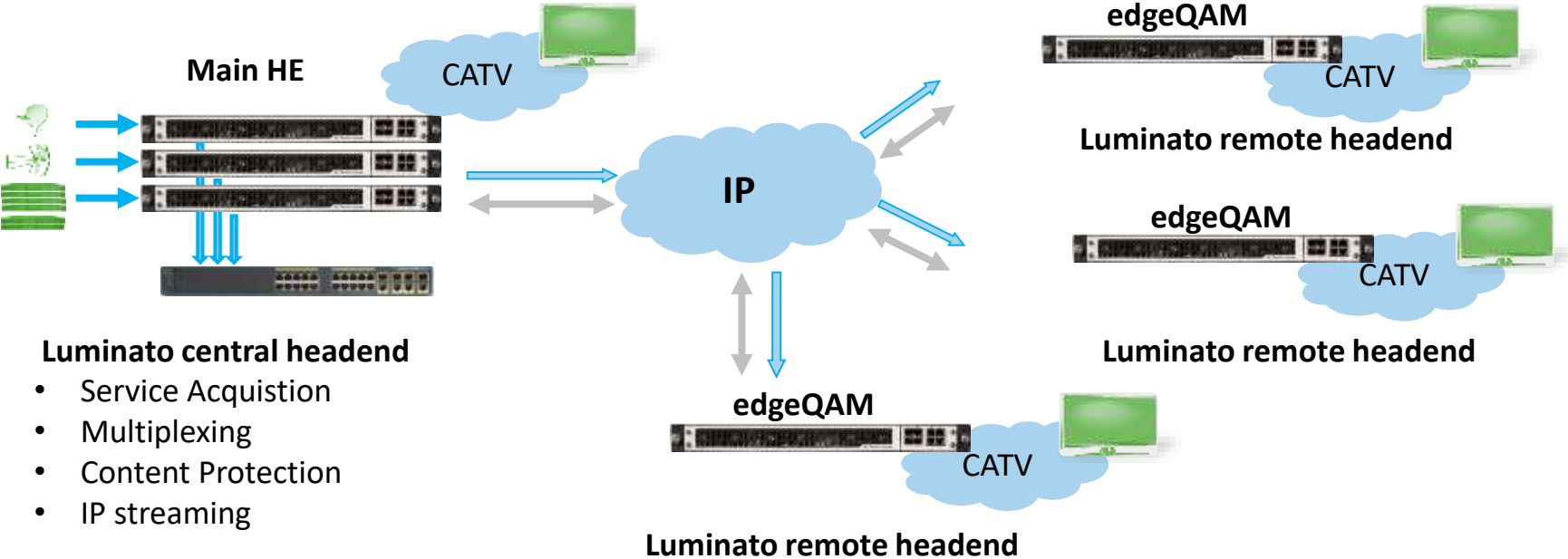
# CA systems used with Luminato 4X4



# System examples



# Cable network architecture



# Luminato 4X4 edgeQAM – operation modes

- **Full transparent passthrough mode (PID passthrough mode)**
  - **Mode selectable per mux**
  - **Especially suitable for main HE – remote edgeQAM system**
  - **Easy management - configuration only done in the main HE multiplexers**
  - **PSI/SI table insertion possible**
  - **No local multiplexing possible**

# Luminato 4X4 edgeQAM – operation modes

- **Service passthrough mode**
  - **Mode selectable per mux**
  - **Enables local multiplexing, channel processing, encryption**
  - **Services can be passed through or locally groomed**
  - **Versatile PSI/SI table management options**
    - **Local automatic or manual**
    - **External PSI/SI table generator with IP multicast streaming and local caching at edgeQAM**

# Luminato 4X4 edgeQAM – operation modes

- **Full local multiplexing mode**
  - **Mode selectable per mux**
  - **Free (re)multiplexing, channel processing, encryption etc.**
  - **Versatile PSI/SI table management options**
    - **Local automatic or manual**
    - **External PSI/SI table generator with IP multicast streaming and local caching at edgeQAM**

# High availability



# Luminato 4X4 edgeQAM – high availability features

## PSU redundancy (1+1)



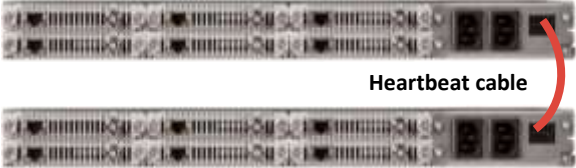
- AC + AC, DC + DC and AC +DC options available

## Input stream / port redundancy



- Enables stream redundancy inside one physical port or in 2 (or more) different physical ports
- Up to 5 redundant streams supported
- Port redundancy option for XE ports with link loss or bitrate triggers

## 1+1 HW redundancy



## In-chassis HW module N+1 redundancy



- N+1 (N=1 ... 5) HW module redundancy
- Up to 3 different redundancy groups

# Teleste CARE



# Teleste CARE – available support levels

Premium	Standard
<p>The following services are included in Teleste's Premium support.</p> <ul style="list-style-type: none"><li>✓ Software upgrades &amp; updates</li><li>✓ Email support</li><li>✓ Telephone support</li><li>✓ 24/7 Email support</li><li>✓ 24/7 Telephone support</li><li>✓ Remote diagnostics</li><li>✓ Repair turn-around time: 7 days</li></ul>	<p>The following services are included in Teleste's Standard support.</p> <ul style="list-style-type: none"><li>✓ Software upgrades &amp; updates</li><li>✓ Email support</li><li>✓ Telephone support</li><li>24/7 Email support</li><li>24/7 Telephone support</li><li>✓ Remote diagnostics</li><li>✓ Repair turn-around time: 14 days</li></ul>

Company restricted

# Success stories



# Luminato 4X4 edgeQAM – success story

- **Over 500 edgeQAM stations delivered so far**
- **Trusted by major European cable operators**
- **Luminato 4X4 edgeQAMs have been replaced during the last years globally following EoL edgeQAMs:**
  - **Commscope (Arris) D5 UEQ**
  - **Mediakind (Ericsson) EQ8096**
  - **Harmonic NSG9000**
  - **Synamedia (Cisco) RF Gateway 1**

# Luminato 4X4 edgeQAM – Some of the customer cases since 2020

- European nationwide MSO with 300 remote EQAM stations and 1.7 M subscribers and 4.6 M HP
- European nationwide MSO with 70 remote EQAM stations
- European nationwide MSO with 50 remote EQAM stations
- European nationwide MSO with 30 remote EQAM stations
- European nationwide MSO with 20 remote EQAM stations
- European nationwide MSO with 10 remote EQAM stations
- European nationwide MSO with 3 remote EQAM stations - starting
- Indian major MSO with > 1 M subscribers

On following link you can find press release for the EQAM project for the Pan-Nordic operator Telenor

<https://www.teleste.com/news-and-insights/press-and-stock-releases/net/new-case-story-telenor-upgraded-to-the-latest-edge-qam-technology-with-teleste-luminato-4x4/>

Company restricted