# LUMINATO 4X4 DIGITAL HEADEND PLATFORM

**TELESTE**

# LUMINATO 4X4
## FOR CABLE TV, IPTV & OTT

Increasing broadband speeds have an impact on access networks, whether they are fibre or coaxial-based, or hybrids deploying both mediums. Cable television networks in particular are at a crossroads as cable operators have a plethora of alternatives at their disposal to continue offering their extensive service portfolios. In future, while all video services might be offered over-the-top deploying broadband data connections, very few cable operators are ready right now to stop traditional broadcasting. Sustainable broadcasting platforms are needed for years to come. Although the scalability of virtualized and cloud-based alternatives may grab the attention of the cable industry, Teleste believes that high-quality, mission-critical broadcast services require dedicated hardware and the benefits of scalability become limited due to the constant 24/7 availability requirements of broadcast services.

# LUMINATO 4X4 DIGITAL HEADEND PLATFORM

The Teleste Luminato 4X4 video headend platform has been designed to cope with existing challenges as well as an uncertain future. It supports video reception in diverse formats through several interface alternatives and its versatile output options guarantee robust transmission over traditional cable television, FTTX and distributed access networks. The QAM, OFDM and IP-based transmission is usually carried by DVB-C and IP protocols deploying RF or baseband frequencies, but Luminato 4X4 is not limited by these protocols as it supports optional L2TP tunnelling and can host a video core module managing distributed access network devices.

## Undisputed leadership

The Teleste Luminato platform is used by massive incumbents as well as small operators in need of broadcast-quality video transmission, high capacity, an intuitive user interface and a farsighted platform that can adapt when new requirements arise. The platform has gained its position of undisputed leadership as a versatile headend supporting wire-speed video processing and over 30 conditional access systems. Luminato 4X4 respects its pedigree by offering reliable 44 Gbps capacity through purpose-built hardware with four 10 Gbps and 1 Gbps Ethernet interfaces. The hardware has impressive 2W/QAM* power consumption that challenges any existing or cloud-based alternatives in terms of energy efficiency. As hundreds of devoted operators are currently using the Luminato platform, the new Luminato 4X4 platform is backwards compatible and supports prevalent Luminato modules.

*Power consumption of Luminato 4X4 platform including six dense QAM modules divided by their capacity 144 QAMs. (320 W/144)

## Versatile interfaces

Luminato multireceiver modules have numerous input alternatives, such as DVB-S, DVB-S2, DVB-S2X, DVB-T, DVB-T2, DVB-C, ISDB-T, ITU-T J.83 A/B/C and IP. For example, one quad multireceiver is capable of supporting all the previously mentioned alternatives in addition to descrambling and scrambling functions. IP output streams from the module can be transmitted either directly to another module in the same chassis for further processing, to IP capable headend equipment next to Luminato or at a remote location, or directly to the IPTV network. Any IP-carried video streams can also be processed further by Luminato output modules, such as the Luminato Dense Modulator. Output modules manage video stream processing, multiplexing, scrambling and PSI/SI table insertion, making streams complete. The completed streams are usually transmitted via Ethernet/IP and QAM interfaces, although other interface alternatives such as ASI and OFDM are also supported.

## Farsighted

Once operators deploy distributed DOCSIS architectures and edge QAM functionality moves to street cabinets, an uninterrupted delivery of broadcast services becomes a challenge. Not only due to extensive field upgrades but also because of the need to deliver traditional broadcast channels over IP. Luminato 4X4 is designed to cope with this challenge as it can act in a video engine and video core roles. In such a case, dense QAM modulators L2TP encapsulate all traffic and send it over IP to distributed access devices often called Remote PHY devices (RPDs). The pure encapsulation is not enough to manage broadcast channels in the same way as before, but the video core functionality embedded in one Luminato 4X4 module liberates video experts to manage broadcasting in the same familiar manner that has been proven to work at all times. Although edge QAMs are in the field, their channels can be configured and managed as they would be when edge QAMs were physically next to the video headends.

## Diverse solutions

While the Luminato platform is used for various applications, the most common use cases are content ingestion, conditional access, multiplexing and broadcasting, either in one multi-function chassis or in several chassis, each one being dedicated to a single function. As one chassis is capable of hosting six modules, they can be freely selected to form centralized or distributed video headend solutions. Four such solution examples are illustrated in Figures 1, 2, 3 and 4.

1: The Luminato 4X4 Edge QAM configuration utilizes six module slots equipped with dense QAM modulators. The configuration allows the transmission of up to 6000 channels through 144 QAM outputs. The total transmission capacity of the QAM outputs is around 7 Gbps and all content is received via one 10 GbE Luminato port or several ports when a redundancy is required.

2: The Luminato 4X4 video core configuration uses QAM modules to form L2TP encapsulated multiplexes that are transmitted through the Converged Interconnect Network (CIN) and QAM modulated in RPDs. The DVB-C broadcast resources are managed by the Luminato Video Core module supporting a Generic Control Plane (GCP) connection.

3: In the Luminato 4X4 content ingestion configuration all module slots contain a multireceiver module. These six modules are capable of receiving encrypted and free-to-air content through various interfaces in several formats and, after descrambling and other advanced stream processing phases, the processed streams are passed to the IP network via 10 GbE and/or 1 GbE interfaces.
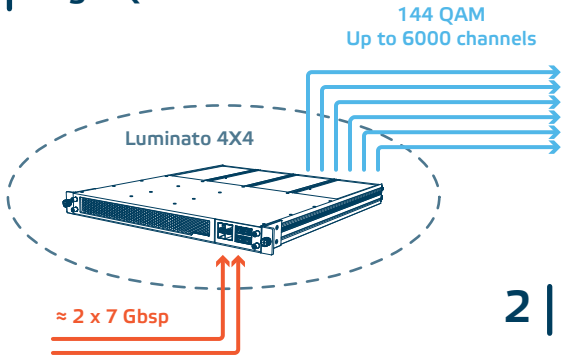
4: The Luminato 4X4 compact headend configuration consists of receivers and transmitters in the same chassis. The example shows five receivers performing decryption and demultiplexing while the output module manages multiplexing, PSI/SI table insertion, scrambling and modulation among other stream processing phases. Besides modulation the processed stream can be sent via the IP output to other IP capable devices..
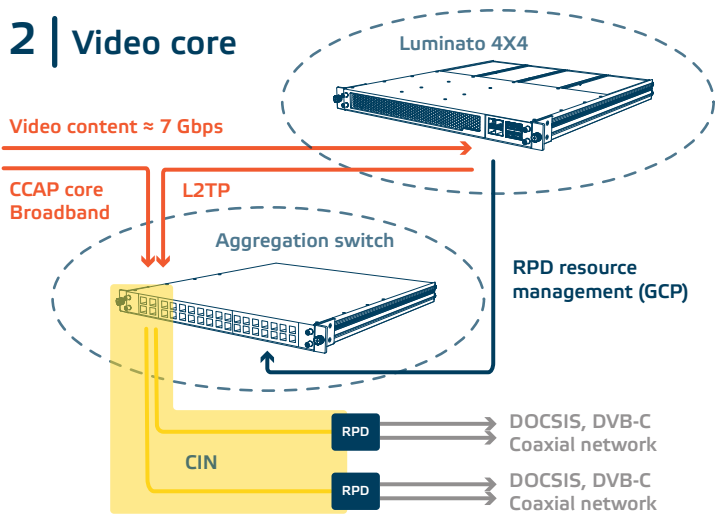
## Reliability

Over the past 10 years, the Luminato platform has proven itself to be one of the most reliable headend platforms on the market. Thousands of Luminato devices are operational around the world 24/7. However, less than 0.3 per cent have been returned for repair. Unquestionable reliability is the result of uncompromised manufacturing processes and design principles. All fans and both power supplies are hot-swappable and maintenance-free, their status can be verified remotely and automatic health checks are performed by the Luminato 4X4. Four 10 Gbps ports support back-up configurations such as 1+1, while stream redundancy is ensured by configurable triggers and SID follow-up. Every Luminato 4X4 is manufactured in Finland and production tests are ruthless after each manufacturing phase until the devices are ready to be shipped.
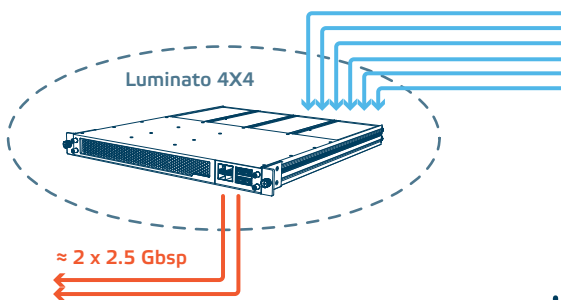
# Unparalleled usability

## 1 | Edge QAM

**144 QAM
Up to 6000 channels**

Luminato 4X4

≈ 2 x 7 Gbsp

## 2 | Video core

Luminato 4X4

Video content ≈ 7 Gbps

**CCAP core
Broadband**

**L2TP**

**Aggregation switch**

**RPD resource
management (GCP)**

**CIN**

RPD — **DOCSIS, DVB-C
Coaxial network**

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Coaxial network**

## 3 | Content ingestion

**DVB-S, DVB-S2, DVB-S2X, DVB-T, DVB-T2,
DVB-C, ISDB-T, ITU-T J.83 A/B/C and IP**

Luminato 4X4

≈ 2 x 2.5 Gbsp

## 4 | Compact headend

**24 QAM
Up to 1000 channels**

**Content ingestion**

Luminato 4X4

**IP**
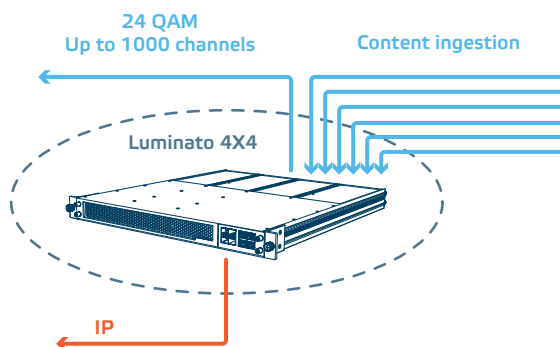
# FEATURES AT GLANCE

Luminato 4X4 digital headend has been designed with a built-in video engine to support operators when they make the shift to distributed access architecture. With its powerful and ultra dense edge QAM, the platform allows operators to freely scale up their video services when the need for channels such as high quality 4K increases.

**2 hot swappable PSU modules**

**Internal Ethernet switch**

## Highlights

- 44 Gbps throughput
- 144 QAMs in 1U
- Parallel QAM, IP and Remote PHY output interfaces
- Backwards compatible with legacy Luminato modules
- Wire-speed scrambling and multiplexing
- Optional Video Core functionality
- Supports over 30 CA systems
- Several redundancy and back-up functions

**All 6 modules are hot swappable**
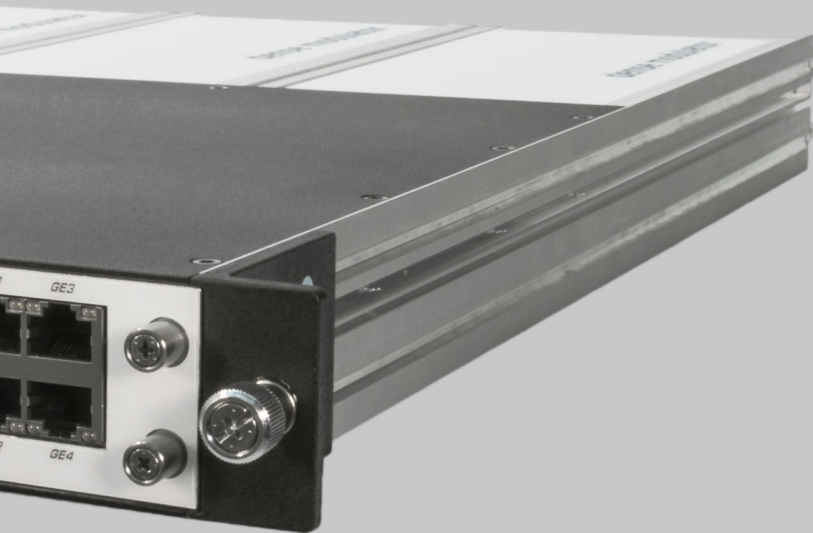
**4*10 Gbps SFP+ &
4x1 Gbps RJ45 Ethernet interfaces**

| AVAILABLE LUMINATO 4X4 MODULES | |
|---|---|
| **RECEIVERS** | |
| ASI | Quad |
| IP | Dual |
| Satellite | Quad, DVB-S/S2 |
| Multireceiver | DVB-S/S2/S2X, DVB-T/T2, DVB-C, ISDB-T, ITU-T J.83 A/B/C and IP |
| **TRANSMITTERS** | |
| ASI | Quad |
| QAM | 24 pcs |
| IP | 60 pcs |
| COFDM | Quad |
| ISDB-T | Quad |
| **OTHER** | |
| EPG | EIT processing |
| APPS | UBUNTU LINUX |
| FEC | IP input/output |
| Video engine | GCP |
| VMX bulk descrambler | 60 channels |

## TELESTE LUMINATO 4X4 CHASSIS SPECIFICATIONS

| CHASSIS | |
|---|---|
| Mounting | 19" rack mountable, 1RU Installation rails for easy installation |
| Dimension (h x w x d) | 1U x 19" x 20" (500 mm) |
| Operating voltage | 100…240 V AC 50/60 Hz, -48 VDC |
| Power consumption | Max 300 W/fully occupied chassis |
| PSU modules | 2 slots for hot swappable modules |
| Operating temperature | -10…55 ºC (14…131 ºF) ambient |
| Relative humidity | Up to 90% (non-condensing) |
| Cooling | Hot swappable fans |
| Interface modules | 6 slots for hot swappable processing modules |

| MANAGEMENT INTERFACES | |
|---|---|
| Four 100/1000 BaseTX | For CAS and NMS |
| USB | For initial setup |

| STREAM INTERFACES | |
|---|---|
| Four 10 Gbps SFP+/SFP slots | Supports electrical and optical modules |

| MANAGEMENT AND MONITORING |
|---|
| Web user interface |
| CLI (telnet/ssh, USB-serial) |
| SNMP monitoring |
| TFTP file transfer |
| API, machine to machine interface for integration purposes |

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