Video Broadcast Optimizer
Release 4.1

The Video Broadcast Optimizer (VBO) delivers superior quality of experience (QoE) to IPTV users. It prevents visual and audio distortions as well as slow channel changes while avoiding large bandwidth demand increments. The Video Broadcast Optimizer is IPTV middleware-agnostic and operates across a wide range of standard conditional access and digital rights management systems. In addition to all above, Simulcrypt AES 128 cipher is introduced from this release onward to enhance the live latency and optimize the cost effectiveness.

As a solution for Fast Channel Change and Retransmission (FCC/RET), the Video Broadcast Optimizer comprises:

- FCC/RET client that runs on set-top boxes (STBs) and connected devices; for example, SmartTV, CAM, and HDMI dongle with the Nokia FCC/RET client integrated. It is pre-integrated into many leading commercial chipsets and their SDKs.
- Video traffic re-wrapper that conditions video traffic for FCC/RET and video denting
- Video caching and forwarding appliance
- Service delivery platform for the operation of the service
- Statistics collector and the statistics analysis report engine (SARE). In addition, the centralized video traffic conditioning and distributed caching and forwarding approach assure superior scalability.
- Simulcrypt AES 128 cipher is incorporated in the video headend VBO Appliance (5910 VBO-RC-X17) re-wrapper. Support wide range of DVB Simulcrypt compliance Key servers, ECMG and EMMG.
Features

- Retransmission of lost or damaged packets at the application layer
- Fast Channel Change
- Video denting
- IPTV middleware-agnostic
- Standards-based (ETSI, DVB) independent of:
  - Conditional access system
  - Network equipment manufacturer
- Open and vendor-supported connected devices integration toolkit
- Extensive operational statistics collection
- DVB / ETSI Simulcrypt standards interop with DRM key servers – ECMG & EMMG (multi vendors)
- AES 128 ECB-L/CE/T, and CBC/ATIS cipher/encryption on re-wrapper egress streams.

Benefits

- Flexible, hierarchical deployment from core to central office (CO)
- Removal or reduction of burst associated with typical channel change solutions
- Highly scalable solution through the combination of video denting and bursting
- Embedded appliance-based solution with low power and reduced footprint
- Ethernet connectivity suitable for any network equipment regardless of vendor or model
- Valuable usage, performance and fault metrics.
- Built-in DVB Simulcrypt Cipher, optimize cost effectiveness.

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Figure 1. FCC-RET solution network topology diagram and interconnection

**Use case #1:** Re-wrap and encrypt using DRM

**Use case #2:** Content encrypted by a 3rd party — Re-wrap only
Technical specifications

Protocols
• ETSI TS 102 034 V1.4
• RFC 3550: RTP RTCP protocol
• RFC 2250: MPEG-2 TS mapping in RTP
• RFC 4585, RFC 4588: Retransmission
• IEEE 802.1AX-2008 Auto-detection of half/full duplex for electrical interfaces
• Autodetection of line speed
• SNMP

Simulcrypt AES 128 Cipher
• ATIS-0800006-v1 & v2 IIF DEFAULT SCRAMBLING ALGORITHM (IDSA) IPTV INTEROPERABILITY SPECIFICATION
• ATIS-0800001_v1 & v2 IPTV DRM Interoperability Requirements
• ETSI TS 103 197 V1.5.1 (2008-10) HeadEnd Implementation of DVB Simulcrypt
• ETSI TS 101 197 V1.2.1 (2002-02) DVB Simulcrypt; HeadEnd Architecture and Synchronisation
• ETSI TR 102 035 V1.1.1 (2002-04) Implementation guidelines of DVB Simulcrypt
• ETSI TS 100 289 V1.1.1 (2011-09) Support for use of the DVB Scrambling Algorithm version 3 within digital broadcasting systems
• ETSI TS 100 289 V1.2.1 (2014-03) Support for use of the DVB Scrambling Algorithm version 3 within digital broadcasting systems
• Advanced Encryption Standard (AES) (FIPS PUB 197)
• ATIS IPTV Standards Development via IPTV Interoperability Forum (IIF)

FCC/RET Server
• Please see MS-ISM and IMM/ISA2 cards for details

Re-wraper
• 200 channels
• 800 Mb/s ingress, 800 Mb/s egress
• 0.25–30.5 Mb/s per channel

Statistics Collector
• 200,000 subscribers per dedicated 1 X 1 TB HDD equipped collector

Client
• Linux 2.6, 3.x 4.x kernel or later, kernel and user space library module and API enables fast porting by STB or connected device vendor
• Integration guidelines and support
• Reference STBs or connected device available
• 300 MIPS minimum
• Shared code base for kernel or user space; select during compilation

Equipment practice network processor unit
• Intel® Xeon® Processor D System On Chip 8 cores and 1.5 MB last level cache per core
• CentOS 7 base Operating System
• IPMI : LOM Module with Aspeed AST1250 chip, Supports IPMI 2.0, redundant BIOS and remote, failsafe BIOS update

System memory
• 64GB DDR4 ECC UDIMMs/RDIMMs and RDIMMs, up to 2400MHz

Ethernet ports
• 8 x copper 10/100/1000BASE-T, RJ-45
• 2x Fiber 10GE SFP+ cages
• 1 Network Mezzanine Card (MNC) bay for PCIe gen.3 based port expansion with 1GE and 10GE and 40GE ports
System I/O
• Serial port x 1
  – 1 x RJ-45 type console port
  – Support max. up to 10 Mbaud, default setting 115,200 b/s 8-N-1
• USB 2.0 x 2 front panel
• Management Port 2 x GE RJ-45
• 1 x 2.5” SATA2 SSDs 32 GB (internal)

Accessories
• 2 x U.S. and 2 x Europe power cable
• 4-post rack mount kit, rack mount brackets with handle

Mean time between failures (MTBF)
• 77,968 hours without hard drive and fan included
• Hard drive MTBF: >1.5 million hours 24/7
• Fan life expectancy: 40,000 hours

Power
• Type: AC dual-redundant power supply units (hot swappable)
• Dual power supply rating AC: AC 100 ~ 240 V at 50 ~ 60 Hz, full range 300 W max.
• Idle load AC: N.A.

Safety
• EN 62368-1 CE Mark
• IEC 60950-1/ 62368-1 CB Scheme
• CSA/UL 62368-1 NRTL
• AS/NZS 60950.1

Electromagnetic compatibility
• ICES-003 Class A
• FCC Part 15 Class A
• AS/NZS CISPR 32 Class A
• VCCI Class A
• IEC CISPR 32 Class A
• EN55032 Class A
• EN 55024
• IEC CISPR 24
• IEC/EN 61000-4-2 ESD
• IEC/EN 61000-4-3 Radiated Immunity
• IEC/EN 61000-4-4 EFT
• IEC/EN 61000-4-5 Surge
• IEC/EN 61000-4-6 Conducted Immunity
• IEC/EN 61000-4-8 Power Frequency Magnetic Field
• IEC/EN 61000-4-11 Voltage Interruptions
• IEC/EN 61000-3-2 Power Line Harmonics
• IEC/EN 61000-3-3 Voltage Fluctuations and Flicker
• IEC/EN 61000-6-2 Industrial Environment EMC Immunity
• IEC/EN 61000-6-4 Industrial Environment EMC Emission

Directives, Regional Approvals and Certifications
• EU Directive 2014/30/EU Electromagnetic Compatibility (EMC)
• EU Directive 2014/35/EU Low Voltage Directive (LVD)
• EU Directive 2012/19/EU Waste Electrical and Electronic Equipment (WEEE)
• EU Directive 2011/65/EU Restriction of the use of certain Hazardous Substances in Electrical and Electronic Equipment (RoHS2)
• CE Mark - Common Europe
• CRoHS - China RoHS
• RCM Mark - Australia
• VCCI Mark - Japan
Environmental

- Operating temperature (air flow 0.7 m/sec):
  0 ~ 40 °C (32 ~ 104 °F)
- Non-operating temperature: -20 ~ 80° C
  (-4 ~ 167° F) and 40° C at 95% RH non-condensing
- Vibration resistance: with SATA HDD: 0.5 Grms, IEC 60068-2-64, 5–500 Hz, 1 hr/axis
- Shock protection: with SATA HDD: 10G, IEC-60068-2-27, half sine, 11 ms duration
- Cooling: 4x system FAN with smart FAN

Mechanical

- Construction: Iron
- Mounting: 1U rackmount
- Dimensions:
  - Width: 430 mm (16.6 in)
  - Height: 44.2 mm (1.7 in)
  - Depth: 500 mm (19.7 in)
- Weight: 15 kg (33 lb)