THALES

OPAL

IP Encapsulator

OPAL is the most efficient and powerful IP encapsulator in the industry today, enabling broadcasters to offer a wide range of data services over any satellite, cable or terrestrial DVB or ATSC compliant network.

OPAL combines both powerful IP encapsulation capabilites and outstanding bandwidth optimization.

Key Benefits

- IP frames encapsulation according to DVB or ATSC specifications
- Powerful IP filtering management
- Unique automatic analysis of the upstream network traffic
- Full management of PSI/SI and PSIP tables
- Optimal bandwidth management with OptiMux® technology
- Outstanding Graphical User Interface
- Optional Simulcrypt fixed key or IP level scrambling protection
- Compatible with all major multicast software and all leading DVB/ATSC receiver devices
- Open platform compliant with DVB-RCS, ATM and DVB-H protocols
- End-to-end IP Broadcasting System Offering

>> IP ENCAPSULATOR

Advanced Software Architecture

The OPAL software environment is based on OpenMux® technology. OpenMux is a multiplexing software kernel which simultaneously manages various input types (Single Program Transport Stream, Multiple Programs Transport Stream, Private Data, IP frames, audio signals, PSI/SI and PSIP tables) and outputs an MPEG-2, DVB and ATSC compliant transport stream. OPAL is built on a client/server architecture, with the OpenMux kernel acting as the server.

Superior Configuration and Supervision

OPAL features intuitive, easy-to-use configuration and supervision software through a dedicated Ethernet interface for local or remote management. The OPAL GUI provides a complete display of all MPEG-2 DVB and ATSC parameters, and provides powerful supervision of all IP inputs.

OPAL also performs automatic analysis and display of the upstream network traffic.

Additionally, an Application Programming Interface (API) is available for controlling the OPAL IP Encapsulator from a dedicated user application via TCP/IP. An optional SNMP agent is also available.

Enhanced IP Encapsulation

OPAL encapsulates IP frames into an MPEG-2 transport stream, and simultaneously manages the following protocols:

- Data Piping, Data Streaming
- Multi Protocol Encapsulation, Addressable Sections and JSAT
- ETF ULE

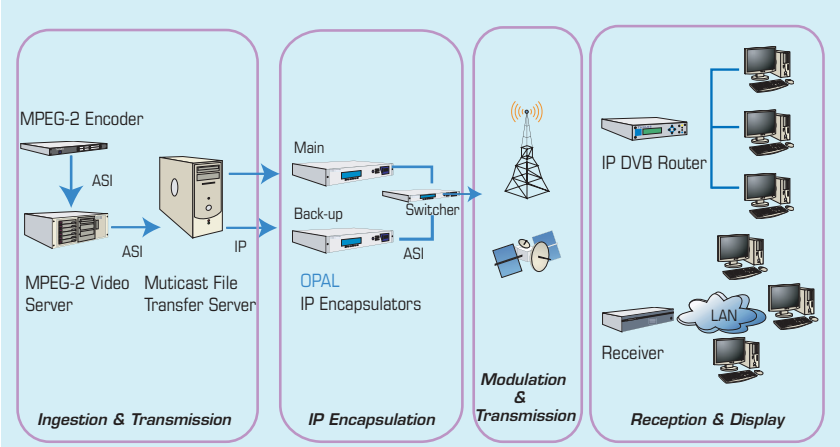
OPAL permits encapsulation of IPv4 or IPv6 datagrams, and manages IPv4 and IPv6 network interconnectivity (IPv4 to IPv6 and IPv6 to IPv4 translation).

OPAL features an optional Ethernet bridge through the MPEG-2 network, using the MPE or Addressable Sections specifications.

Acting as a UDLR server (Uni-Directional Link Routing), OPAL manages the GRE bridge and generates DTCP Hello.

- MAC addresses management:

IP copy for easy MAC management (RFC 1112 compliant)



Opal Environment

MAC/IP association table management via the OPAL's GUI, private API, text files or via SNMP. In addtion, OPAL can manage up to 65535 MAC addresses per network.

Powerful IP Filtering

OPAL features the following filtering options:

- MAC source/destination addresses
- IP source/destination addresses (with subnet capabilities)
- TCP/UDP source/destination port number
- Diverse protocols & services

Advanced Bandwidth Management

OPAL simultaneously provides three different bandwidth policies to enhance the Transport Stream.

Static rate management

A PID can be assigned with a static rate, and reserved in the multiplex.

Virtual Channels

OPAL allows multiplexed bandwidth to be divided into several virtual channels with each virtual channel including several services or PIDs. By assigning priorities and setting parameters to each service, bandwidth is dynamically shared between different services.

Opportunistic Data Insertion (ODI)

As an option, OPAL supports OptiMux, a powerful Thales patented technology. OptiMux maximizes bandwidth by inserting data into the broadcast stream's unused bandwidth, according to rate and priority policies.

Thus, OPAL performs unique "opportunistic IP within IP" functions by flow-controlling some of the transfers of the Multicast File Transfer server, using SMPTE 325M or private protocol.

High-Speed Internet

When integrated into OpenStream HSI, Thales' compact high-speed Internet platform, OPAL performs the transfer between the IP and broadcast TV environment, while sharing the bandwidth of different services, according to the Service Level Agreement. OPAL is the perfect solution for remote locations, where a wired-based investment may be deemed unprofitable.

Digital Video Content Delivery

OPAL integrates within Thales' Store & Forward platform, which is comprised of key Thales products providing ingestion & transmission, IP encapsultation, reception and content forwarding.

MPEG-2 DVB and ATSC Tables Management

OPAL is fully compliant with DVB/ATSC standards and generates:

- MPEG-2 PSI tables (PAT, CAT and PMT)
- DVB SI tables (NIT, SDT, TDT, and INT)
- ATSC PSIP tables (MGT, VCT and STT)

Inputs & Outputs

- Up to 4 Ethernet 10/100 Mbps of physical inputs
- Up to 80 Mbps of IP datagrams
- 50 different IP inputs - simultaneously
- ATM board and Ethernet Gigabit (optional)
- Live DVB-PI ASI input for ODI (optional)
- DVB-PI ASI output interface

Ordering Information

Ordering number	Description
TNM-5220	20 Mbps - 25 services
TNM-5240	40 Mbps - 50 services
TNM-5280	80 Mbps - 50 services
TNM-5211	OPAL DVB-H

Please contact Thales at the numbers below for further details on OPAL's available options.

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