Scienta Media OCTOPUS Multiplexer

Technical Specification

Rev 1.04

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Abbreviations and Definitions

MPEG – Motion Picture Expert Group

TS – MPEG Transport Stream

SPTS – MPEG Single-Program Transport Stream

MPTS – MPEG Multi-Program Transport Stream

DVB – Digital Video Broadcasting (European Digital TV System)

IPTV – Internet Protocol Television

DVB-ASI - (Digital Video Broadcast Asynchronous Serial Interface) – A cable TV industry open network standard.

References

[1] ISO/IEC 13818-1: "Information technology - Generic coding of moving pictures and associated audio information: Systems".

[2] ETSI EN 300 468: Digital Video Broadcasting (DVB); Specification for Service Information (SI) in DVB systems.

[3] ETSI TR 101 290: Digital Video Broadcasting (DVB); Measurement guidelines for DVB systems.

General Product Description

The Scienta Media “Octopus” Multiplexer is a Real-Time (Live) Multi-Program Transport Stream Multiplexer (MPTS). The multiplexer combines multiple Single-Program Transport Streams (SPTS) / MPTS inputs into Multi-Program Transport Stream (MPTS). The TS-over-IP and DVB-ASI interfaces are supported for both input and output streaming. The output MPTS may be delivered to multiple destinations simultaneously (e.g. via IP and DVB-ASI at the same time).

Target Applications

The target applications of the Scienta Multiplexer are video broadcasting systems requiring live transmission of multiple video channels within one stream. Among others, typical applications are DVB (DVB-T / S / C) and IPTV systems. The multiplexer is typically integrated into video broadcasting system as one of the modules, accepting input streams from video encoders and producing high-bitrate output MPTS ready for terrestrial, satellite, cable or IP broadcast.

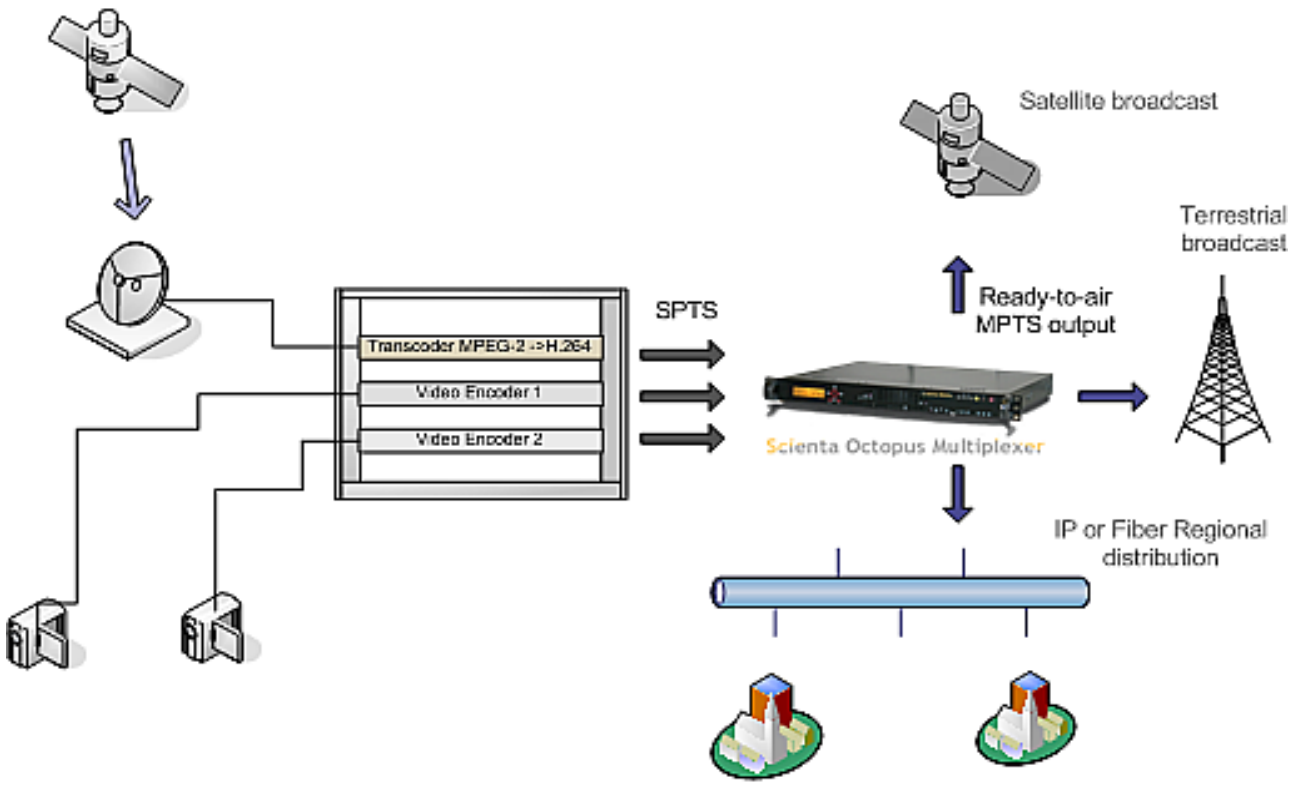

Fig. 1 – Typical Use Case of the Multiplexer in DVB / IPTV Networks

Compliance to Standards

» ISO/IEC 13818-1 System: Transport Streams
» ETSI TR 101 290 (DVB Measurement Guidelines)
» ETSI EN 300-468 (DVB S / T / C)

Principal Architecture

The multiplexer is implemented as a “client – server” software. The server part is a Win32 service. The client is IIS WEB application. The communication (management) protocol is SNMP. The figure below illustrates the principal architecture of a network with multiple multiplexers and single IIS server with the Scienta WEB application client for remote conrtol and status monitoring.

The WEB client can be installed on the same PC as the Multiplexer Service itself – no need in a separate PC.

System Requirements

Table 1 - Multiplexer Server (Win32 service) system requirements

Operating System	Windows 7 (recommended) Windows Server 2005 / 2008 / 2010 Windows XP
CPU	Minimum: x86 / 2x core / 2 GHz. Recommended: **Output bitrate < 80 Mbps:** Intel Core 2 Duo; **Output bitrate >= 80 Mbps:** Intel Xeon QuadCore.
RAM	16 MB base + 4 MB per each input stream
Ethernet	2x 1 Gbps Ethernet. Recommended to use dedicated interface for inputs and dedicated interface for output.
HDD Space	128 Mb

Table 2 - WEB client system requirements

Operating System	Windows 7 (recommended) Windows Server 2005 / 2008 / 2010 Windows XP
WEB Server	Microsoft IIS 6.0 or higher
CPU	Intel or AMD 1 GHz
RAM	256 MB
Ethernet	1x / 100 Mbps
HDD Space	64 MB

Recommended Hardware Configurations

Table 3 – recommended hardware configurations for leading hardware vendors

Hardware Vendor	Model / Line
HP	HP ProLiant DL: IIntel® Xeon® E5606 2.13 GHz / 4 GB DDR3 /
SuperMicro	**SuperServer 6012P-i :** mini 1U Intel® Xeon® X3430 2.4 Ghz / 4 GB DDR3 / LAN 2x 1Gbps Intel 82574L / 32 GB SSD
Dell	**PowerEdge R320:** Intel® Xeon® E5-2407 2.20GHz / 4 GB UDIMM / Intel Ethernet I350 DP 1Gb Server Adapter / 32 GB SSD

Input / Output Format Specification

Input Streams

An input signal shall be 188-byte Transport Stream input (either SPTS or MPTS).
An Input TS may contain H.264, MPEG-2, MPEG-4, VC-1 video, MPEG Audio, AAC / AAC-HE ADTS / LATM, AC-3 audio, DVB teletext, user-defined private data.
An input TS can be fed into the multiplexer via IP or DVB-ASI interfaces.

Table 4 - Input Interfaces / Protocols

Interface	Protocol	Note	Max TS Rate
IP	UDP	Unicast / Multicast / Broadcast modes	Unicast: **80 Mbps per input** Multicast / Broadcast: up to **40** Mbps per input
DVB-ASI	ASI	Dektec DVB-ASI devices are supported, http://www.dektec.com	**220** Mbps per input (interface limitation)

Output Stream

The multiplexer produces 188-byte Multi-Program Transport Stream (MPTS). The output TS is DVB compliant.

Table 5 - Output Interfaces / Protocols

Interface	Protocol	Note	Max TS Rate
IP	UDP	Unicast / Multicast / Broadcast modes are supported.	Unicast: **500 Mbps** Multicast / Broadcast: up to **120** Mbps
DVB-ASI	ASI	Dektec DVB-ASI devices are supported, http://www.dektec.com	**220** Mbps (interface limitation)

Supported Output DVB SI Tables:

- PAT
- PMT
- NIT
- TDT
- SDT
- EIT

Control and Monitoring

Monitoring and control of the multiplexer is performed either via the native Scienta Meida web client provided along with the multiplexer. Alternatively, the Multiplexer Server can be managed directly via SNMP (integrated into 3rd party NMS systems).

One single IIS web application client instance is sufficient to manage multiple multiplexer server instances.

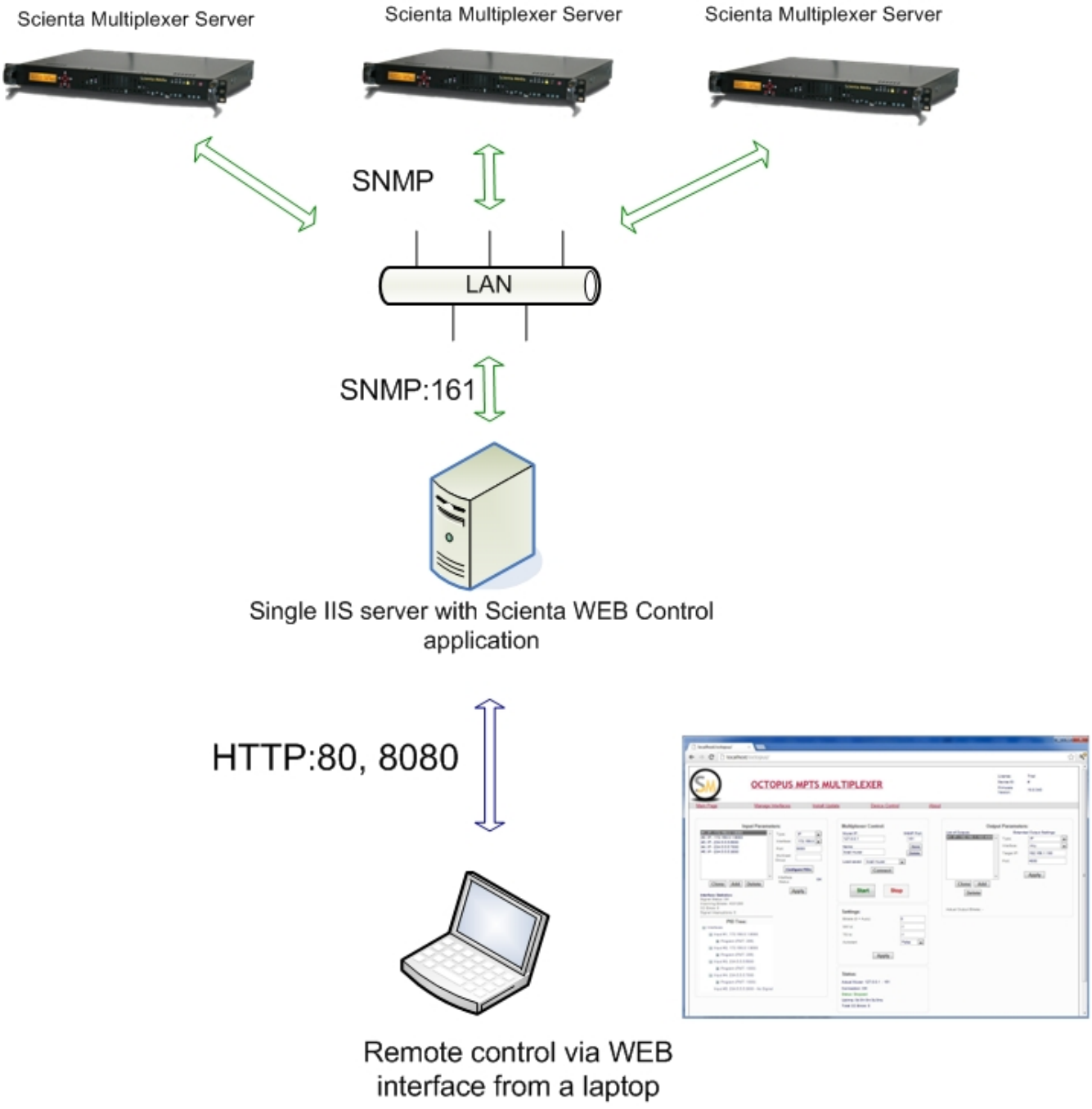

Fig. 2 – Control of multiple Multiplexer instances via single Scienta WEB Client

The native web client provides complete control and configuration of the multiplexer. Please refer to the User Manual for detailed information.

Monitoring Metrics

The multiplexer performs instant monitoring of the following parameters:

- signal presence at each input;
- number of Continuity Counter (CC) errors by each input;
- number of signal interruptions by each input;
- programs / PIDs / Mediatype of each PID available at each input (presented as a PID tree);
- total number of CC errors by all inputs;
- Running-up time of the multiplexer;
- Actual Output bitrate.

Advanced Features

» PID remapping;
» automatic PID conflict resolution;
» automatic PAT/PMT regeneration;
» PID / Service (Program) blocking;
» configurable program name / provider name (SDT descriptors);
» language descriptor configurable;
» manual / automatic output bitrate;
» signal presence monitoring by each input;
» monitoring of CC errors by the input interfaces;
» input TS structure presented as a PID tree, real-time updating.

Configuration Parameters

Table 6 - Transport Stream Parameters

Parameter	Units / Available values	Default	Description
Output Bitrate	Bits per second	0	Output bitrate (mux rate) of the produced MPTS. If the value is 0, the multiplexer determines the output bitrate automatically based on the sum of input bitrates.
NW ID	0-65535	-1	Transport Stream Network ID as defined in ISO-13818-1. If the value is -1, the NW ID is determined by the multiplexer automatically.
TS ID	0-65535	-1	Transport Stream ID as defined in ISO-13818-1. If the value is -1, the TS ID is determined by the multiplexer automatically.
New PID	0 - 8192	N / A	The PID is unique stream identifier within TS as defined in ISO-13818-1. Changes the given PID to the specified value of the “New PID”. Available for either Program (PMT PID) or Elementary Streams.
Block PID	Yes / No	No	Blocks the given input PID. The blocked PID is rejected from the corresponding PMT and isn't delivered to the output MPTS. * If Block Pid = YES for PMT PID, the entire Program is blocked.
Program Name	String	Empty	Program (service) name as defined in ISO-13818-1.
Provider Name	String	Empty	Provider name of the program (service) as defined in ISO-13818-1.
Language Code	3x char	Empty	Available for Audio PIDs only. Language code as per ETSI EN 300-468.

Document History

Date	Revision	Comment
December 2009	1.0.0	The first revision of the document.
September 2010	1.0.1	Remote Control via the WEB Client: overall architecture is redesigned, update of the document.
August 2011	1.0.2	System requirements for the WEB client are updated
March 2012	1.03	Examples of leading vendors configurations are updated
May 2012	1.04	Advanced features are updated