Emerging MPEG2 Solutions

What's new and happening in MPEG transport stream manipulation for Digital Broadcasting

THOMCAST

THALES

Ref :

Where are we?

- One year away from mandated On-Air Dates
- 185 Station in 63 markets, serving 67% of US households
  - Of those 185 as of Jan 1, 2001 there are 26 PBS member stations serving 25% of all US households
- The 185 DTV stations are currently transmitting:
  - 480i SD
  - Some form of HD
    - Either 1080i native or 720p
    - Up-converted 480i to 720p or 1080i
- All striving to light up STB's to drive displays

Where do we need to go?

- PSIP
  - Still needs attention
  - Most broadcasters don't understand how to set up PSIP correctly
- Introducing XML Schema for importation of PSIP information
  - Proposed to ATSC for Standardization
- Myers ProTrac and Thomcast have worked to bring system to PBS

Sample XML event

```
<psip:CHANNEL channel_number="57-1" short_name="SD1">
        <psip:EVENT time="2000-12-15T12:00:00-05:00"
duration="PT30M" action="add">
            <psip:NAME lang="en">Noddy: Closing Up
Shop</psip:NAME>
            <psip:DESCRIPTION lang="en">Noah tries desperately to
drum up business at the NODDY shop after receiving a singing "eviction" notice from the
bank.</psip:DESCRIPTION>
            <psip:PARENTAL_RATING region="1"
dimension="Children" value="TV-Y" action="add"/>
            <psip:AC3AUDIO lang="en"
service_type="complete_main" num_channels="2/0" action="add"/>
            <psip:CAPTION lang="en" cc_type="line21"
action="add"/>
        </psip:EVENT>
```

The PSIP Tables

- *STT (System Time Table) Required*
- MGT (Master Guide Table) Required
- TVCT (Terrestrial Virtual Channel Table) Required
- RRT (Rating Region Table) Required
- EIT (Event Information Table) Required
- ETT (Extended Text Table) Optional

STT (System Time Table) Required

- Correct Time and Date information is the responsibility of the service provider. This time is used to set the STB's date and time reference, and the starting of events on time.

The PSIP Tables

- STT (System Time Table) Required
- MGT (Master Guide Table) Required
- TVCT (Terrestrial Virtual Channel Table) Required
- *RRT (Rating Region Table) Required*
- EIT (Event Information Table) Required
- ETT (Extended Text Table) Optional

MGT(Master Guide Table) Required

- Contains Information about all the other tables in PSIP with the exception of STT
- Location (PID)
  - Size and Version

The PSIP Tables

- STT (System Time Table) Required
- MGT (Master Guide Table) Required
- *TVCT (Terrestrial Virtual Channel Table) Required*
- RRT (Rating Region Table) Required
- EIT (Event Information Table) Required
- ETT (Extended Text Table) Optional

TVCT (Terrestrial Virtual Channel Table) Required

- Contains a listing of all Virtual Channel streams within the actual or other Transport Streams , including Digital (DTV), Analog (NTSC) and Data (If present)
- Contains the STB tuning information
- Contains Channel Names
- Specifies If and where the Extended text Message can be found
- Modulation Mode and Carrier Frequencies (Analog NTSC or DTV 8VSB)

The PSIP Tables

- STT (System Time Table) Required
- MGT (Master Guide Table) Required
- TVCT (Terrestrial Virtual Channel Table) Required
- *RRT (Rating Region Table) Required*
- EIT (Event Information Table) Required
- ETT (Extended Text Table) Optional

RRT (Rating Region Table) Required

- This table contains the TV Rating for both the viewing guide as well as the V-Chip
- Contains the data for multiple geographic regions.

The PSIP Tables

- STT (System Time Table) Required
- MGT (Master Guide Table) Required
- TVCT (Terrestrial Virtual Channel Table) Required
- RRT (Rating Region Table) Required
- *EIT (Event Information Table) Required*
- ETT (Extended Text Table) Optional

EITs (Event Information Tables) Required

- Lists event information in the program guide. Transmitted in 3 hour blocks
- PSIP requires the presence of a minimum of 4 tables (3x4 = 12 hours)
- This is where the importation of Program Schedule data is placed. This comes from a database, a traffic system or a listing service such Tribune Media Service (TMS)

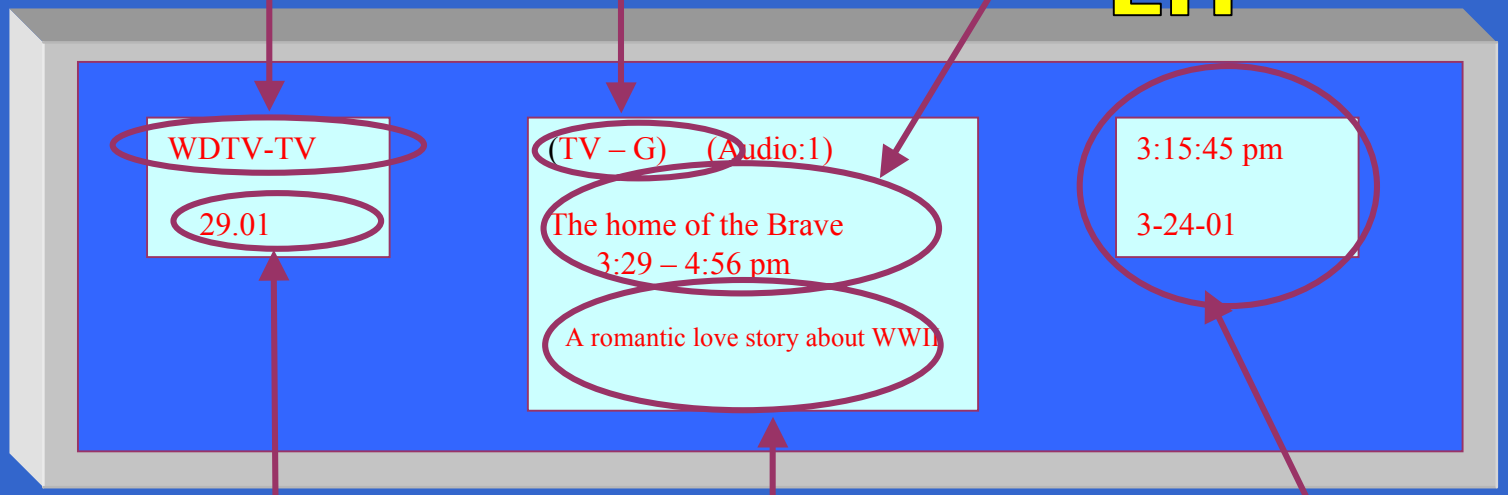
The PSIP Tables

- STT (System Time Table) Required
- MGT (Master Guide Table) Required
- TVCT (Terrestrial Virtual Channel Table) Required
- RRT (Rating Region Table) Required
- EIT (Event Information Table) Required
- *ETT (Extended Text Table) Optional*

ETTs (Extended Text Tables) Optional

- Within these optional tables detailed descriptions (Text) are stored
- Text is for virtual channels and events

What you see and from Where



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TSID Assignments 12/9/98

NTSC TSID DECIMAL	HEX	DTV TSID DECIMAL	HEX	State	City	CHANNEL NTSC	CHANNEL DTV
2	0x0002	3	0x0003	AK	ANCHORAGE	2	18
4	0x0004	5	0x0005	AK	ANCHORAGE	4	20
6	0x0006	7	0x0007	AK	ANCHORAGE	5	22
8	0x0008	9	0x0009	AK	ANCHORAGE	7	24

DTV TSID #

Major Channel Number

- The above table is a selection from the MSTV document that can be found on their web Site

Site www.whd-tv.com

Typical DTV Frequencies

•NTSC Visual Carrier frequency – 1.25 MHz above the lower end of the channel frequency

•Pilot Frequency 0.31 MHz above the lower end of the channel frequency

		DTV INFORMATION	
DTV Call Letters	WCAU	Band Center Frequency	791.000000 MHz
DTV Channel	D67	DTV Pilot Frequency	788.309441 MHz
City	Philadelphia	Second Harmonic Frequency	1582.000000 MHz
State	PA	Third Harmonic Frequency	2373.000000 MHz
		NTSC INFORMATION	
NTSC Channel	N10	NTSC Visual Carrier Frequency	193.250000 MHz
NTSC Offset		NTSC LO Frequency (FT8)	29.875000 MHz
NTSC Call Letters	WCAU	NTSC LO Frequency (GPS)	239.000000 MHz

Transport Stream Storing, Serving, and Splicing

- Thomcast today delivers to the DTV market place an MPEG-2 Transport Stream Server by the name of Sapphire. Sapphire can store as many hours of TS programming as you can build large disk arrays, handling up to 160 Mbits/s through put and up to 50 programs.
- Sapphire can both record and play back simultaneously single, or complex Transport Streams, with up to four inputs and four outputs, at rates of up to 40 Mbits/s each. The stream server has inherent stream splicing capabilities. Splicing of Live to recorded, recorded to live, recorded to recorded, and live to live MPEG-2 TS. Interoperability API's make interfacing to Facilities Management Systems possible. The only thing missing is HD logo insertion

Sapphire Features

- De-Multiplexing in real time of filtered incoming streams
- Record-List and Play-list scheduled on a weekly basis
- Time Delay of one or several streams can be delayed from seconds to hours
- GOP Accurate editing, setting in and out locators
- Splicing, between each program in the play list
- Re-Multiplexing with OpenMux technology, allows for the handling in real time, several play-lists, creating an ATSC Compliant output multiplex that can feed directly to the transmission system

MPEG2 Video Broadcasting

MPEG2 Encoders

Live MPEG2 Sources

Sapphire

Broadcast

optibase

MPEG2 Streaming Devices

Minerva Networks

Monitoring/ Broadband

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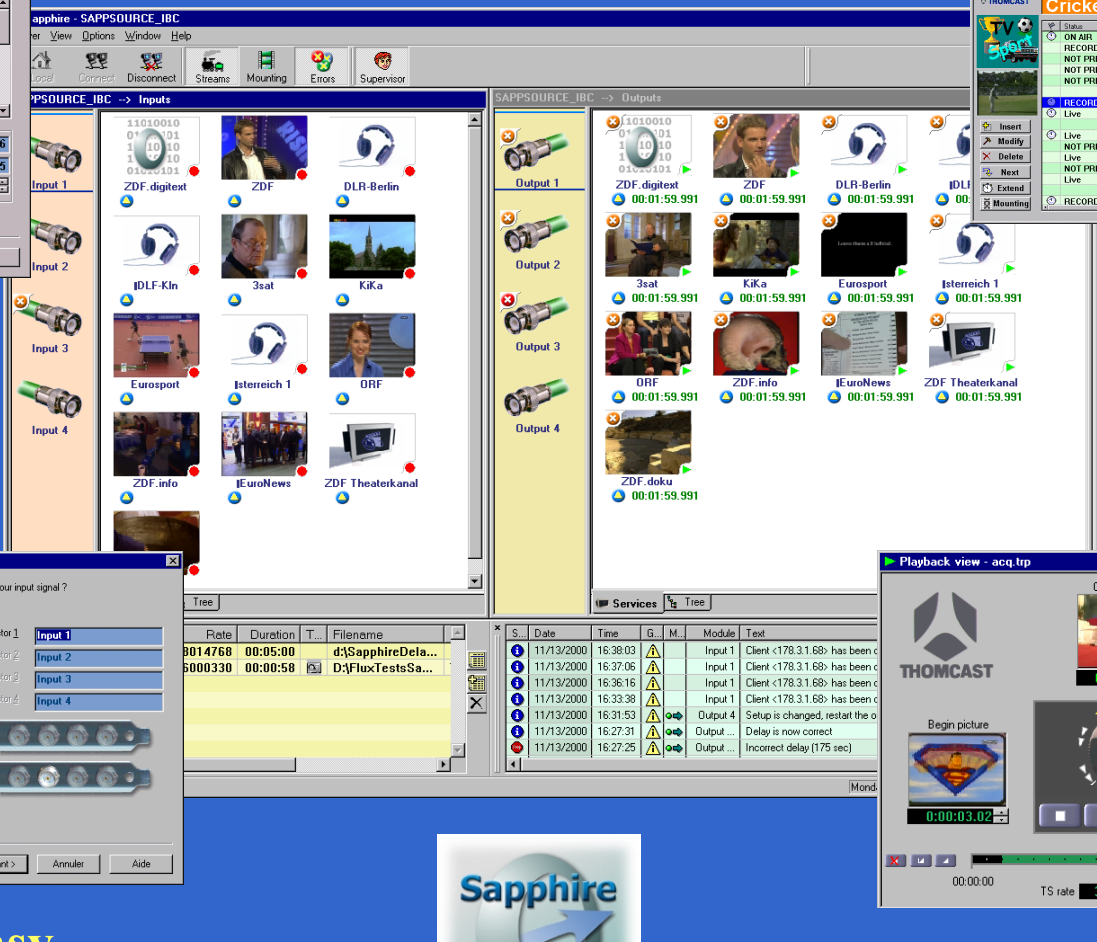
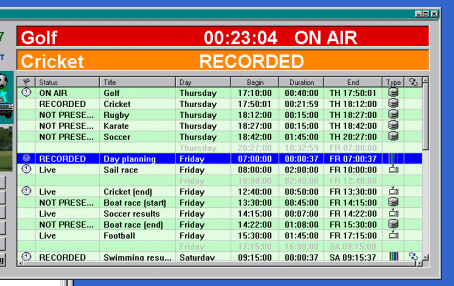
Ref :

MPEG2 Video Broadcasting

MPEG2 Parameters Management





Record & Play-Lists

Easy Configuration

Mounting Features

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Watermarking

- In Rennes, France resides the Thomcast development facility where we do all of our MPEG development. Presently under development is our Watermarking for copywrited material, which is a transparent DCT function on the encoded signal. It is a short and difficult step for us to take but think about it. If we can do transparent DCT block manipulation why not semi-transparent and make it a TS logo inserter, for both HD and SD as well.
- Work is also underway at Tektronix to usw watermarking for lip sync correction.

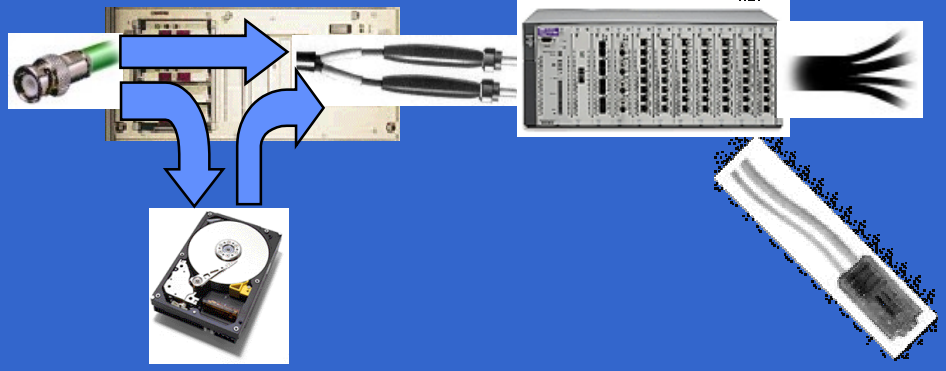
ATVEF

- Speaking of HD logo insertion and ATVEF in the same breath in not so far fetched. With ATVEF implemented in the Transport stream, we can put anything, anywhere, anytime. Controlling the Bug insertion and removal could become an automation command in the Facilities Management System. There is however, a small but perhaps compelling reason not to do this. There are, while the absolute number is small, a significant number of STB's that cannot display ATVEF, and these viewers would not be able to see the station logo in this form.

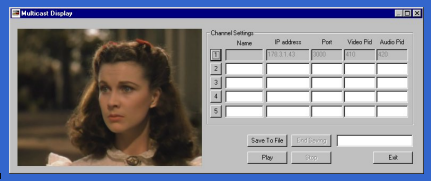
TOPAZ - MPEG2 over IP Systems

Take up to 160 Mbit/s
of Live MPEG2 Sources

Use your Classical Ethernet
Equipment/Cabling



Stream MPEG2 (Live or recorded)
Content over IP/Ethernet



Receive in Multicast (or Unicast)
on PC or Ethernet STB

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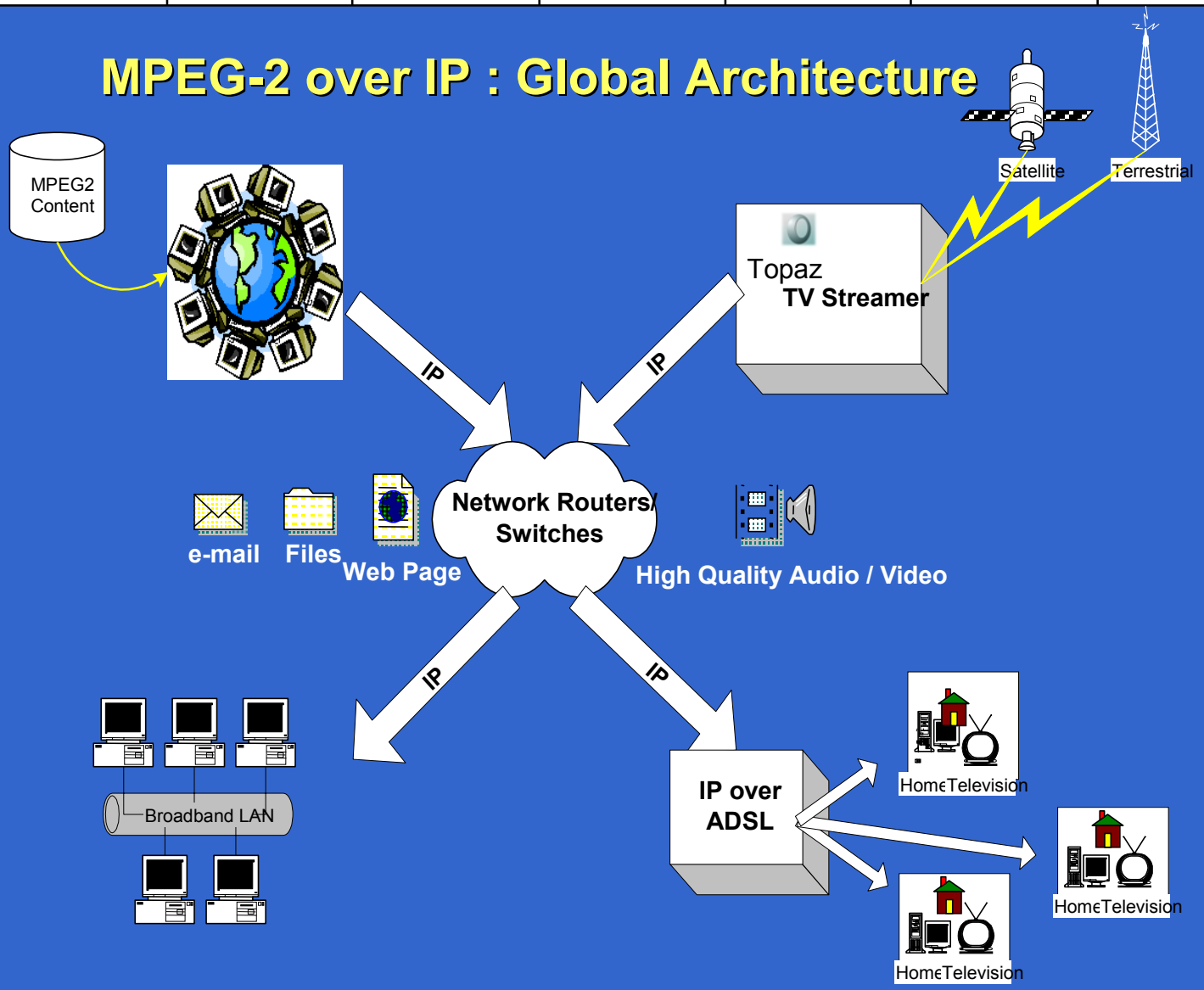
Ref :

MPEG-2 over IP : Global Architecture



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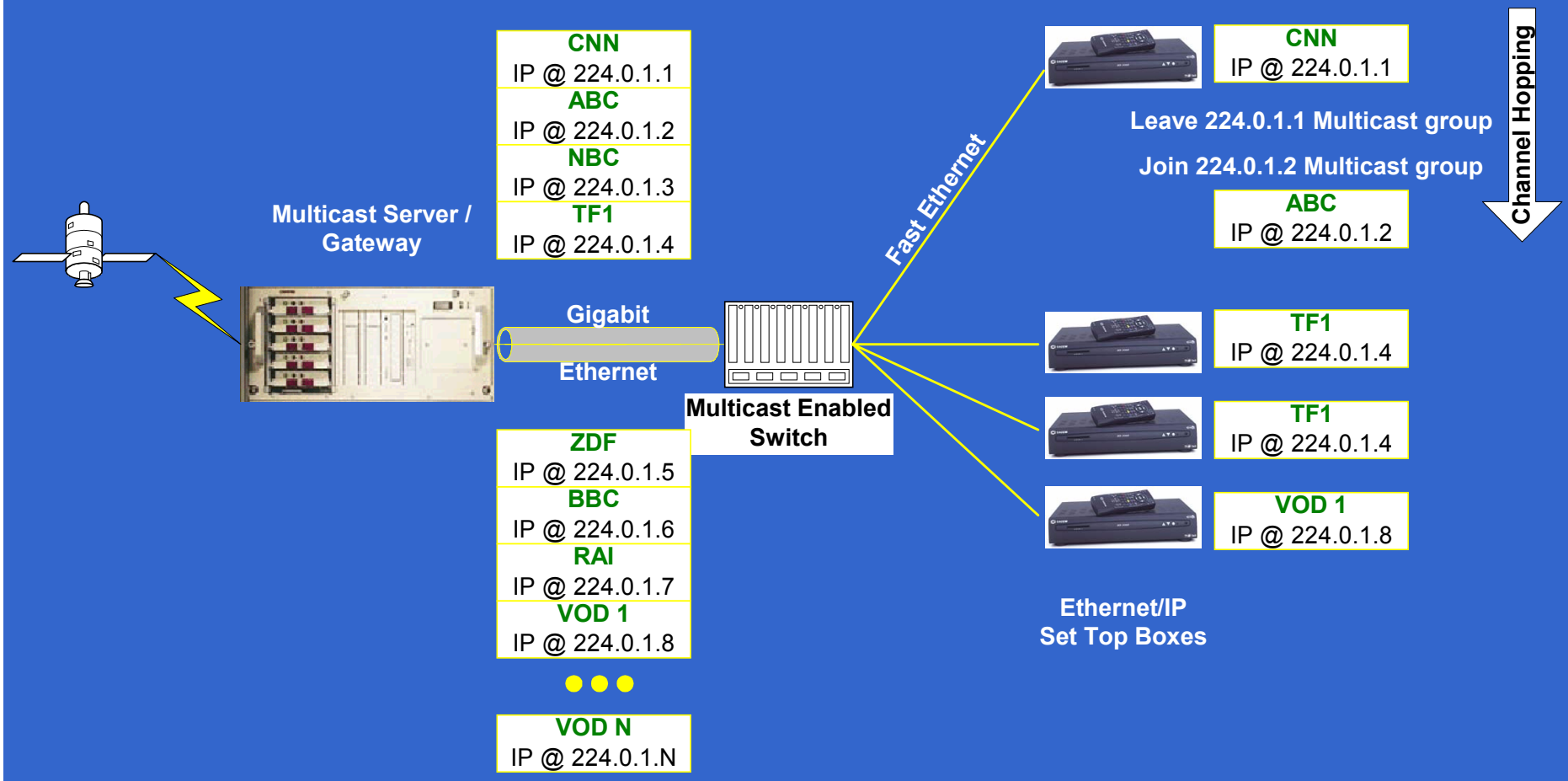
Ref :

MPEG-2 over IP : How does it work?



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Deliverable DTV Solutions

Digital Pass Through

Digital Pass Through

- It is branded by PBS at Channel 80
- It contains only the PBS master logo
- There is no PSIP or EPG information associated with the signal, specific to the broadcasting station
- There is no provision for addition of local content to the TS allowing the creation of a bouquet of deliverable services

New Product introductions by Harmonic

- Harmonic will have two displays of particular interest to PBS stations (and other ATSC broadcasters):

HD statistical multiplexing.

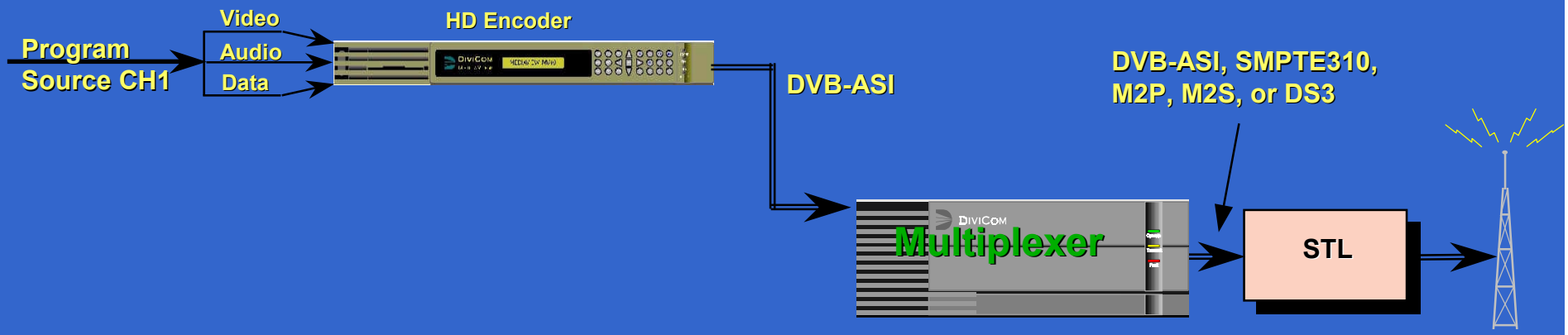
The demo we will show is not a finished product, rather a capability demonstration. We intend to release it as a part of our normal DiviTrack product later this year. The new product will be named "DiviTrackXE", the XE being eXtended Efficiency. DiviTrackXE will permit a statistical multiplex of 1 HD, 2 SDs, and data!

New Product introductions by Harmonic

- Harmonic will have two displays of particular interest to PBS stations (and other ATSC broadcasters):

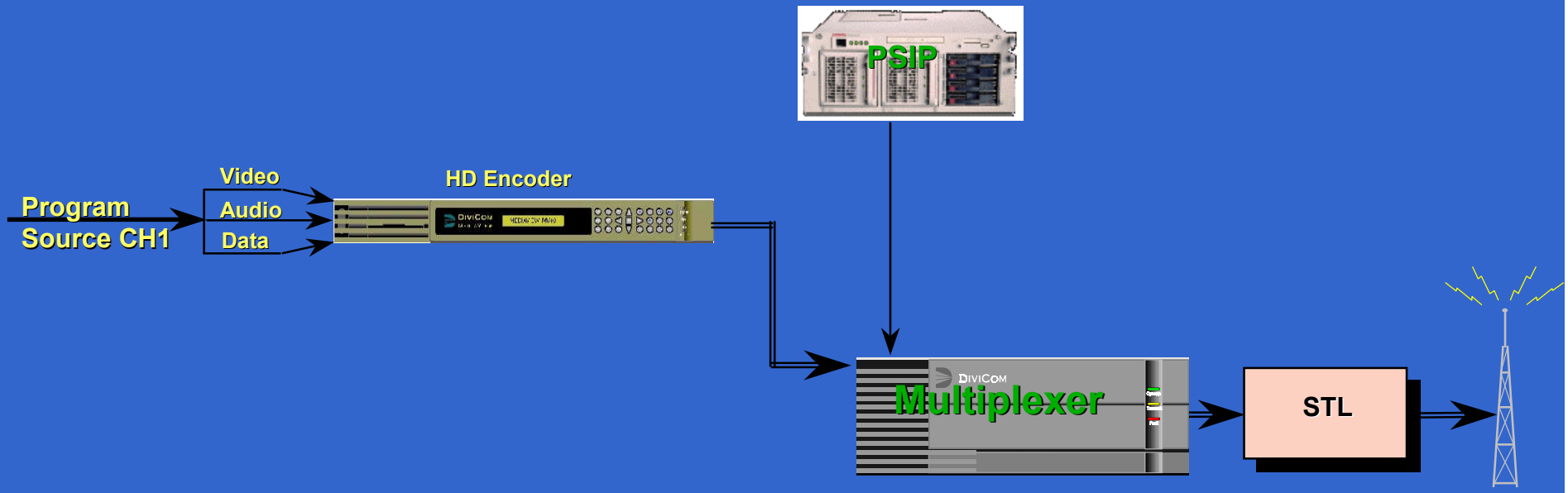
A new MV50 encoder, with really enhanced noise filters. This is a truly impressive demo of the power gained by combining the filters with the encoder, so that there is real interaction between them. This permits much improved pictures AND much lower bitrates (down to 1 - 2 Mbps!).

Start with a basic system.



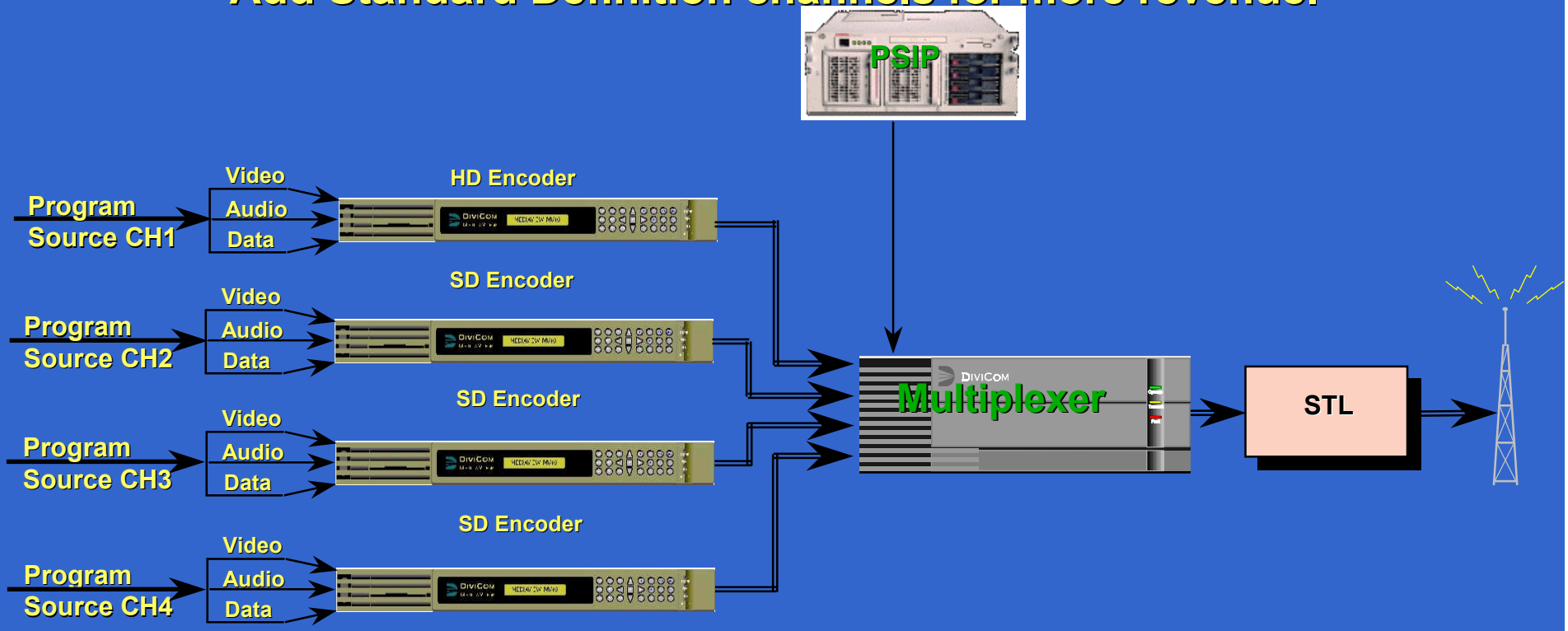
- Open standards at MUX input and output allow integration with equipment from many vendors.

You need PSIP



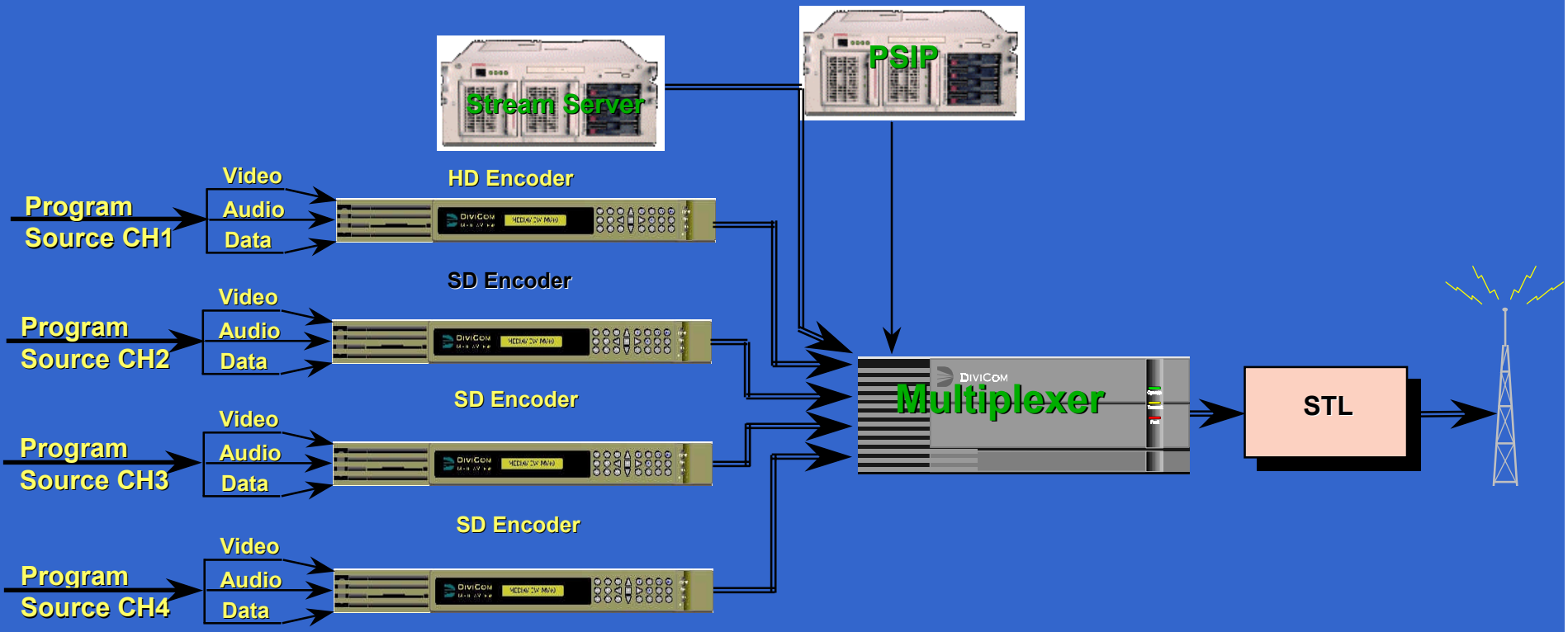
- XML PSIP importation from Myers ProTrac
- PSIP data tells the set what is on the air, and creates a program guide.
- PSIP solutions are available from Thomcast MMP, and other sources.
- PSIP can integrate in with either DVB-ASI or Ethernet.

Add Standard Definition channels for more revenue.



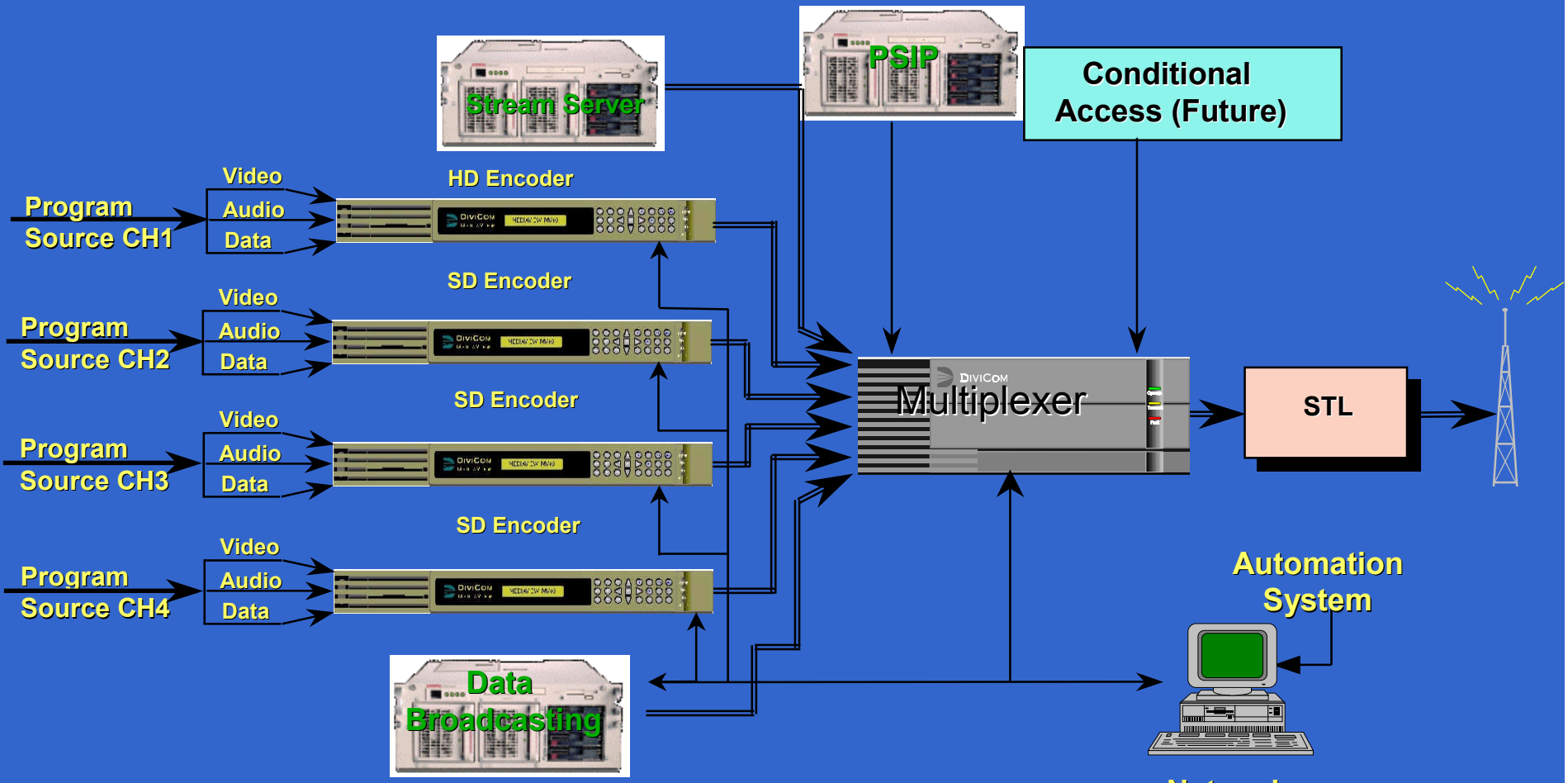
- Statistical multiplexing will allow the most SD channels possible. It is also possible to add SD with HD if program content is well managed.
- It is important to know how long it takes to change modes.

Add a Sapphire server system.



- Servers can interface via open standards like DVB-ASI. This allows streaming material without re-encoding.
- It is also possible for a server to stream multiple programs in the same transport stream. This makes it possible to tightly control data rates.

Add Data Casting Elements



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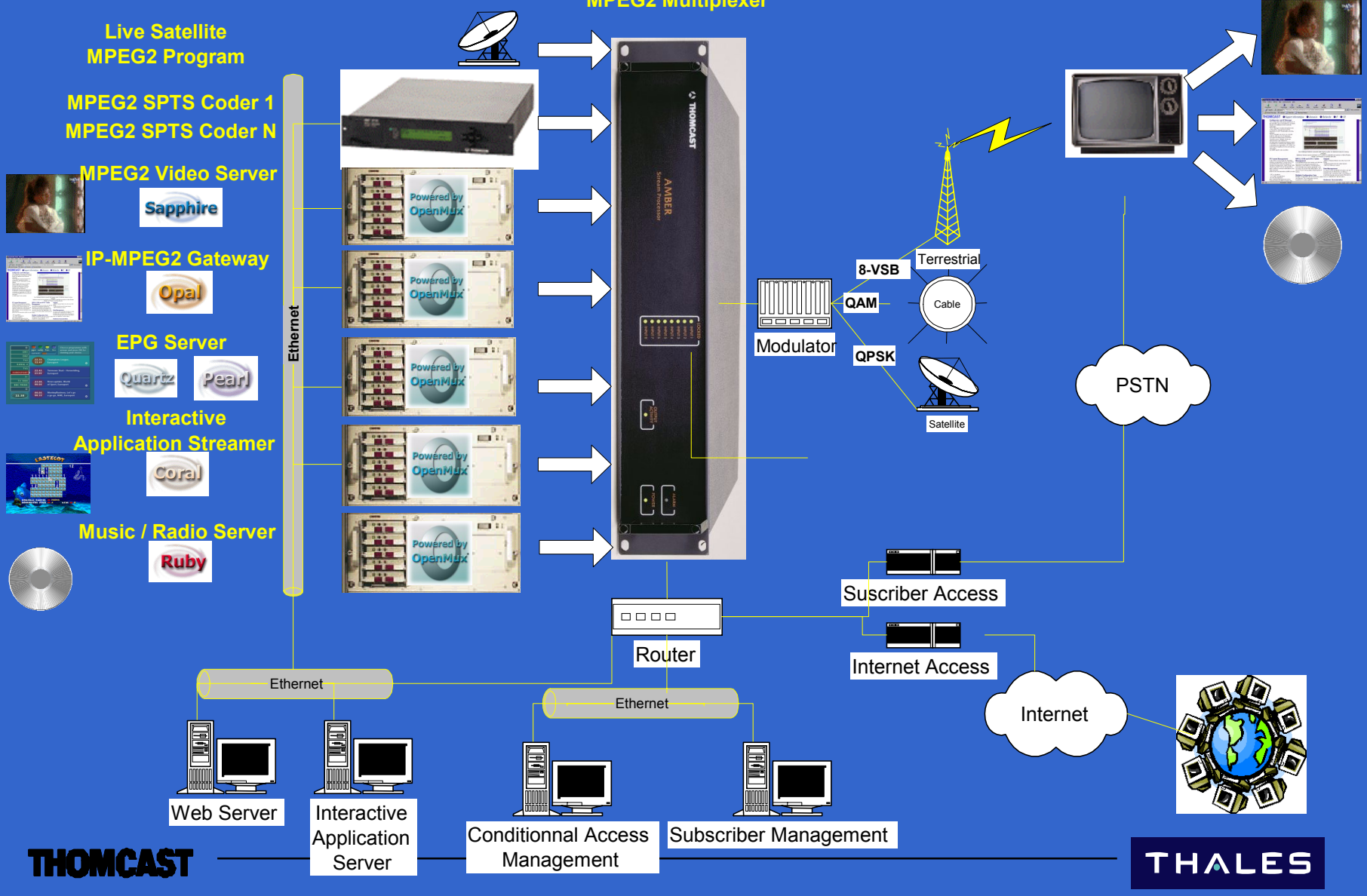
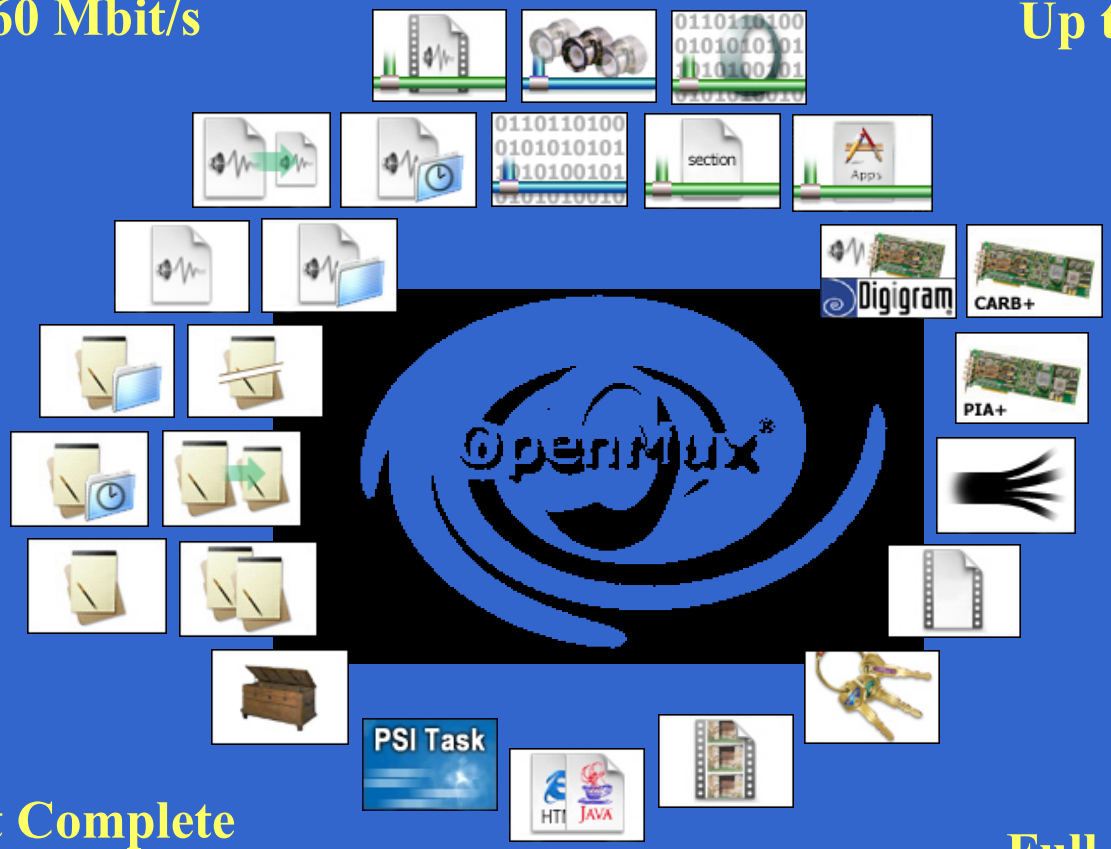
DTV Station Example



Enter The Galaxy !

Up to 160 Mbit/s

Up to 200 Services



The Most Complete Broadcast/Broadband Server System

Full DVB & ATSC Implementation

Use The API...

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Thank you for your attention

George Anderson

Sales Manger for

Multi Media Products

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