# DVB Terrestrial Broadcasting - 2

**Peter Barnett, C.Eng.**

**peter.barnett@mandercom.co.uk**

**+44 1794 341053**

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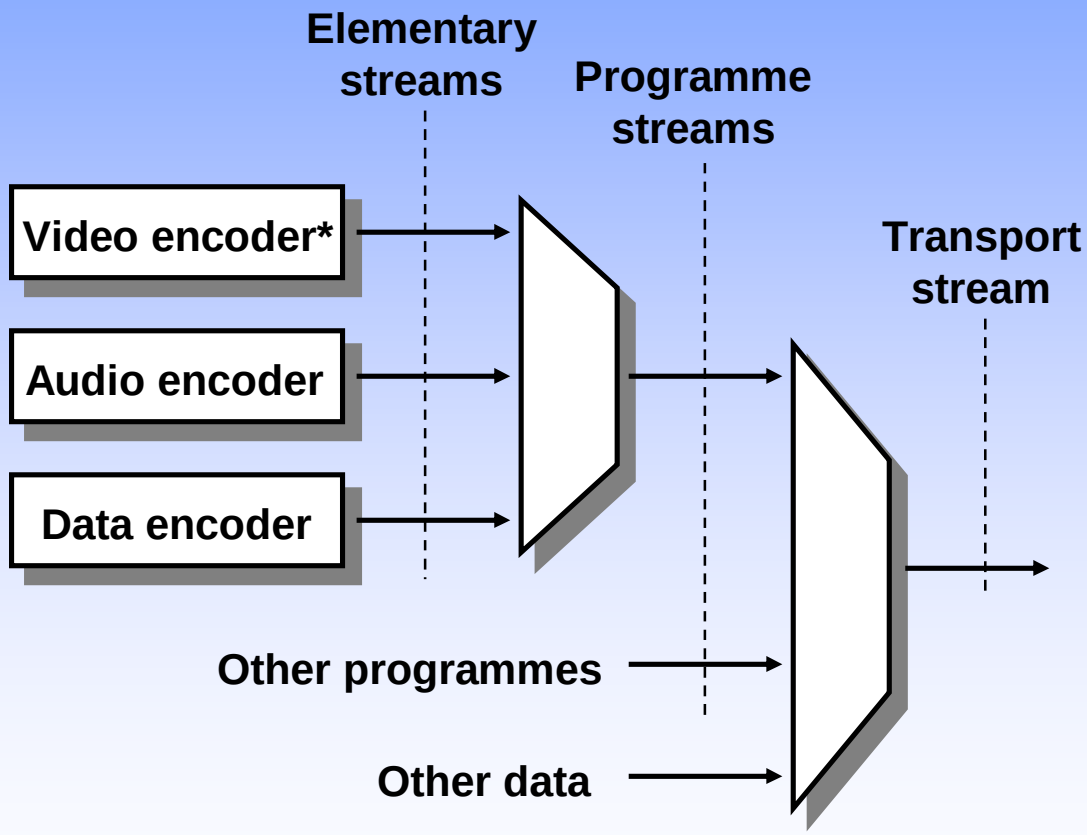
# MPEG system layer




** standard definition (SD) or high definition (HD)*

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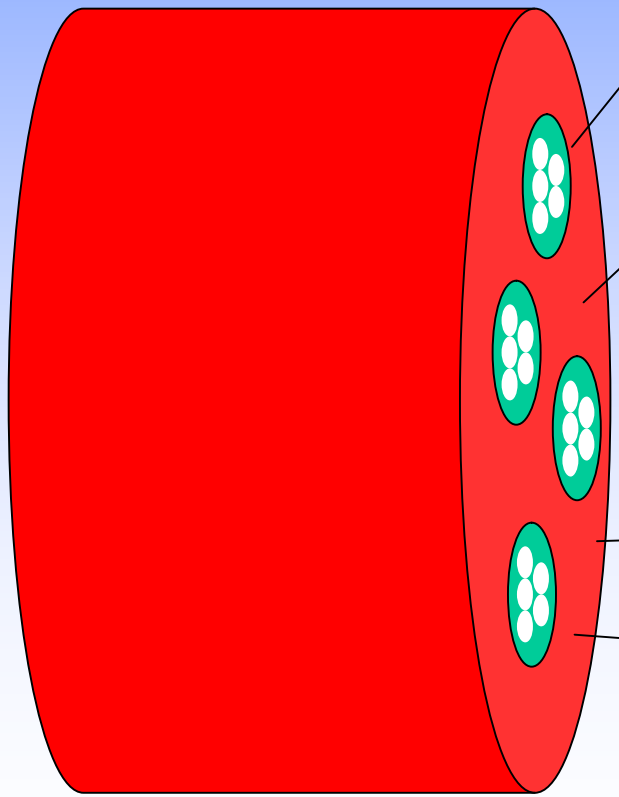
# Transport Stream

The Transport Stream can be viewed as a ***data pipe*** that carries multiple different ***threads*** of data.



MPEG: Program Specific Information
(CAT, PAT, PMT)
Information for the decoder

DVB: Service Information
BAT, EIT, NIT, RST, SDT, TDT & TOT
Information for the user and service

Services (DVB speak) or
Programs (MPEG speak)
carrying Elementary streams

Private CA data in Tables

Other private data (in Tables,
Elementary Streams, etc.)

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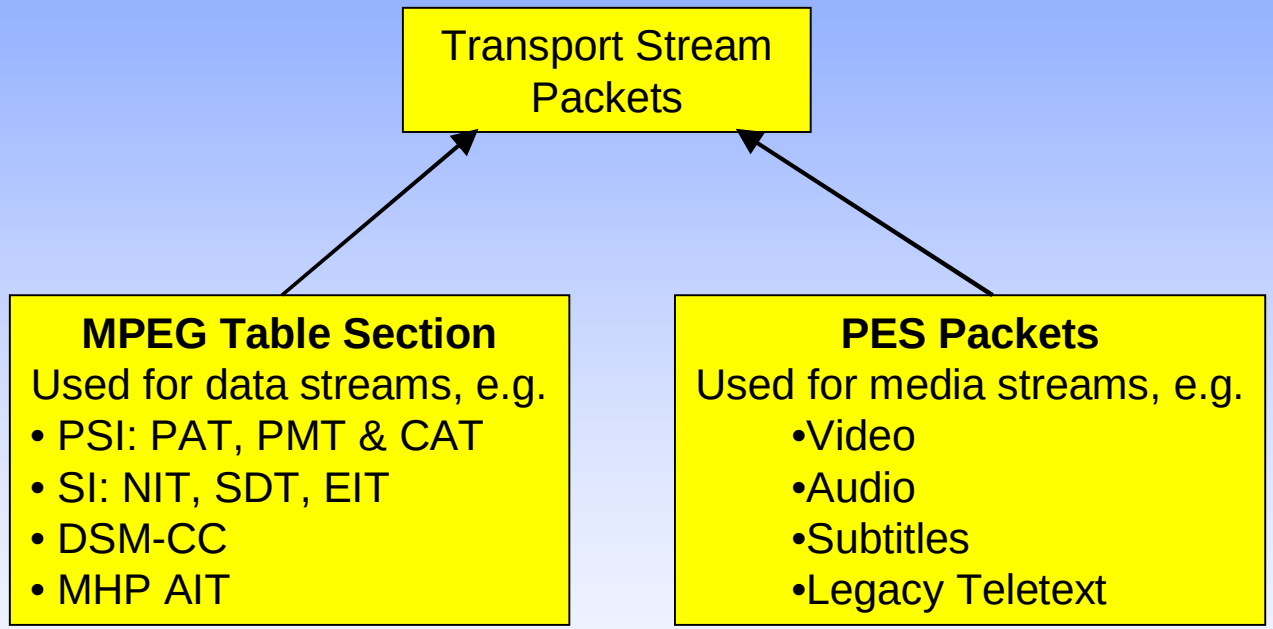
# Containers for data carriage



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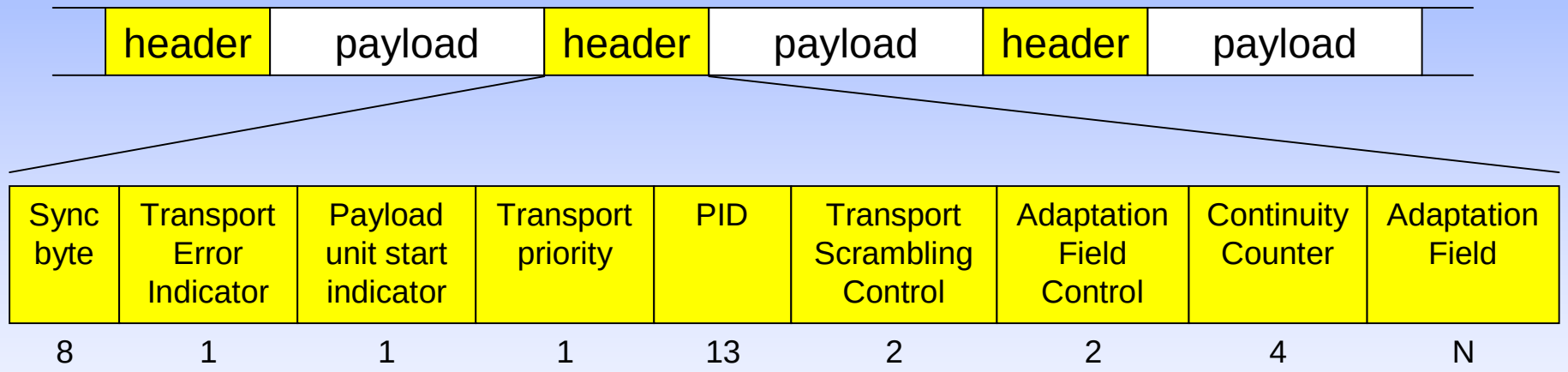
# The Transport Stream Packet

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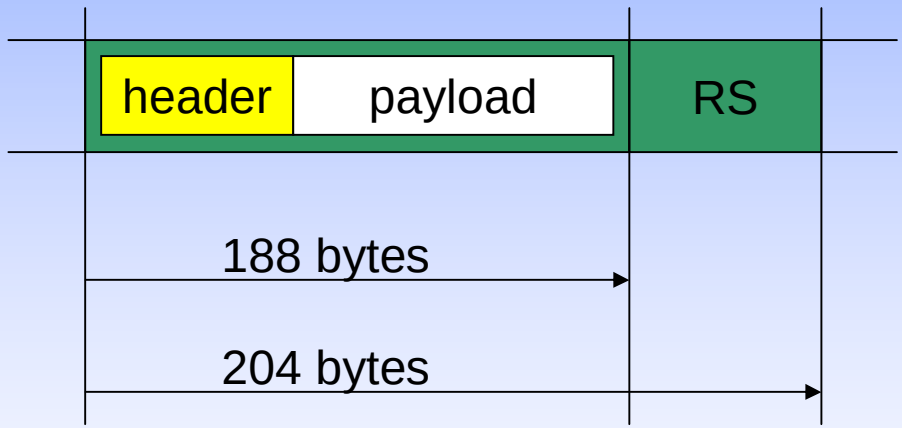
# Reed Solomon error correction

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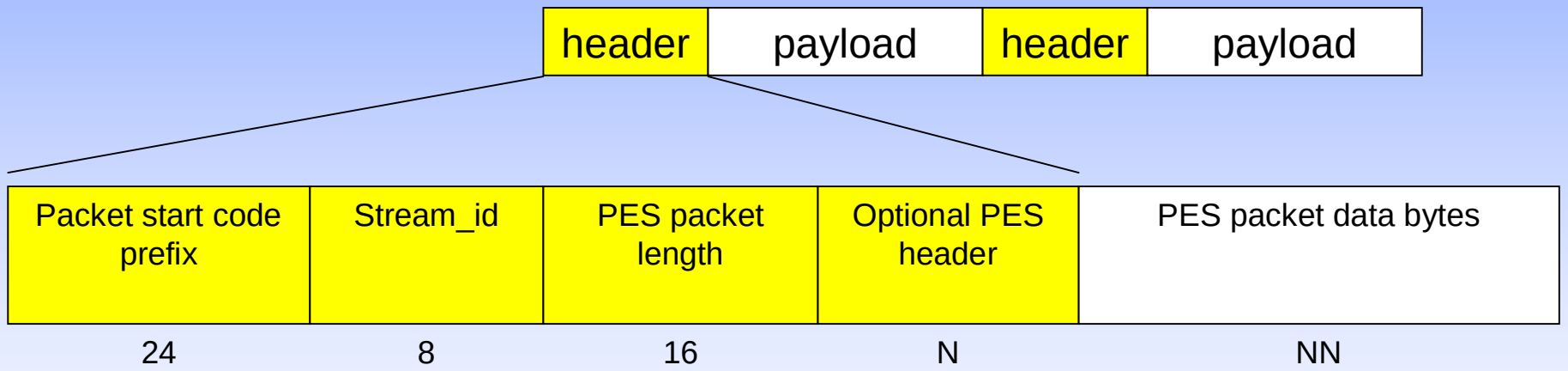
# PES packets

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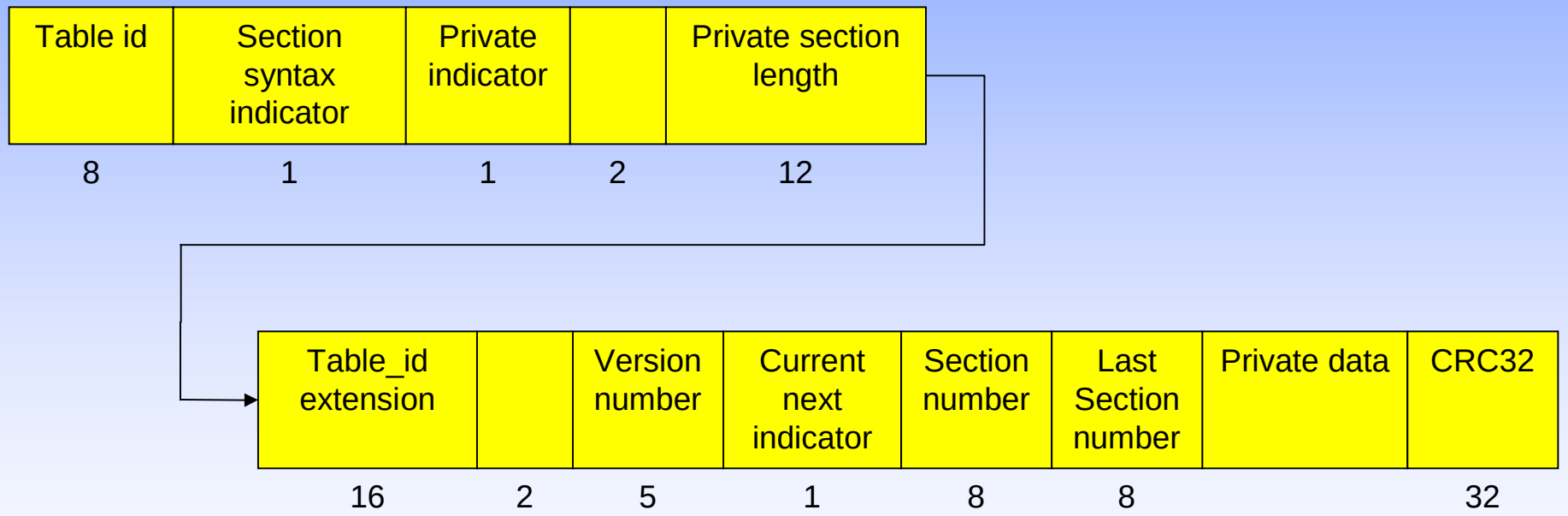
# MPEG Sections

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# MPEG PSI

- **Program Association Table (PAT) points to a PMT for each Program**
- **Program Map Table (PMT) describes components of a Program**
- **Network Information Table (NIT) provides tuning information for Services (including other multiplexes).**



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# MPEG PSI

- **MPEG PSI provides a basic directory structure to access a Program / Service within a Transport Stream.**
- **The first step is for the receiver to acquire the PAT. This is always on PID 0 so is easy for the receiver to find.**
- **The PAT lists the services in the Transport Stream and tells the receiver where to find the PMT for each service. The PMT then tells the receiver how to decode the service.**
- **The PAT & PMT only describe what is in the current Transport Stream. The NIT tells the receiver what is other Transport Streams and how to access those transport streams.**
- **The information in the PSI just refers to services as numbers, so it is useful to equipment but not humans!**

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# DVB SI

- **Service Information provides a directory structure that allows the *consumer* to choose a Program/Service or Event.**
- **The SDT provides a name for a service and a number (the same number that is used in the PAT).**
- **The EIT describes the programmes in a TV service. As a minimum this describes what is on now. The EIT can also provide a simple EPG describing future programmes.**
- **DVB SI is a rather loose specification. The details of how it is used varies between countries. There are often additional specifications (such as the DTG D-Book or EICTA E-Book) that provide these details.**

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# DVB SI

- **Bouquet Association Table (BAT) describes collections of Services**
- **Service Description Table (SDT) provides a name and ID for services**
- **Event Information Table (EIT) describes what's on when. Organised on a service by service basis.**
- **Running Status Table (RST) signals the start and stop of an event.**



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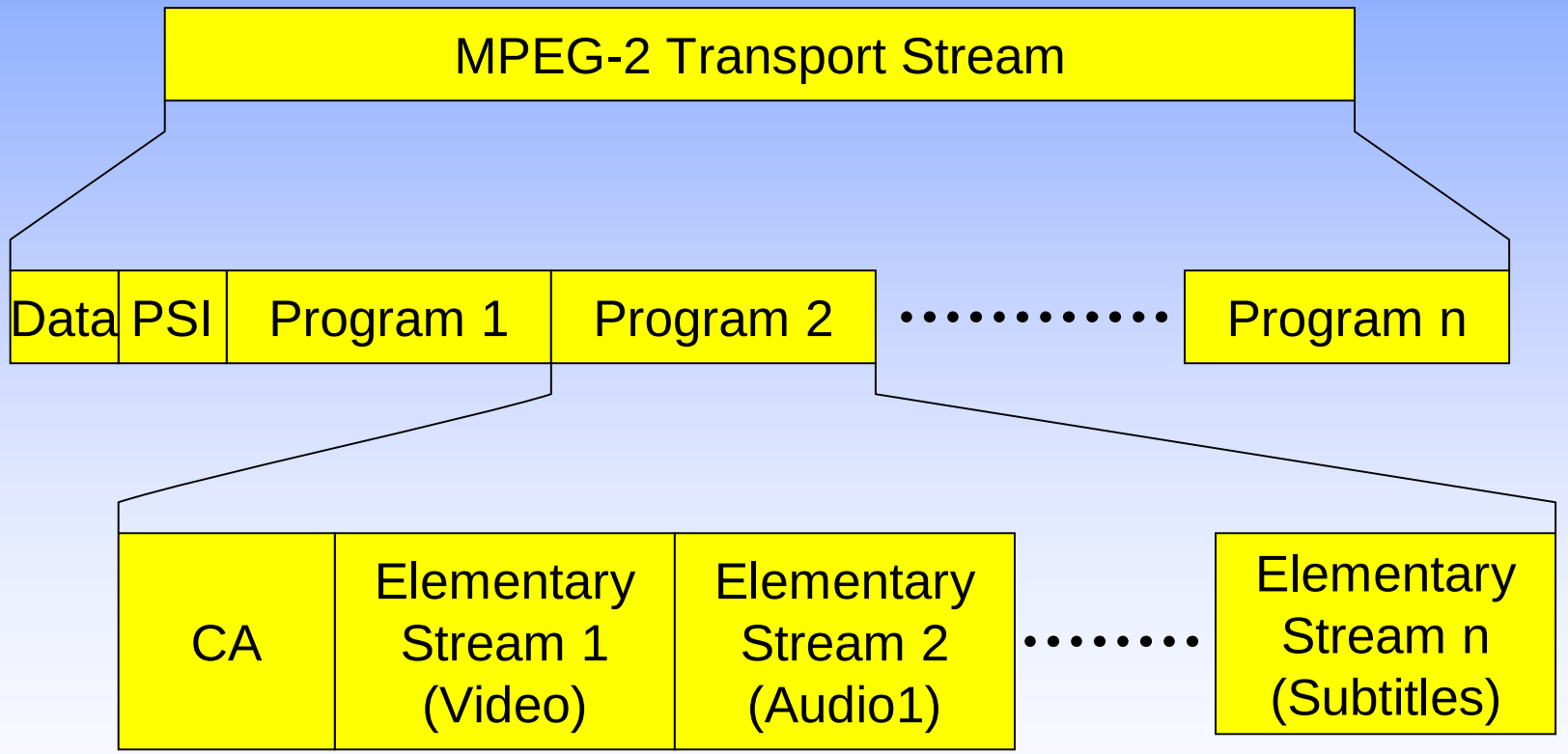
# Contents of the Transport Stream

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# Logical Channel Number

- **An LCN is a human-friendly number assigned by the broadcaster to a service to make it easy for the user to select that service. E.g. a station called Channel 4 might be allocated to 4. Pressing 4 on the remote control selects Channel 4.**
- **Works best in a single operator environment. Needs careful co-ordination with multiple operators!**



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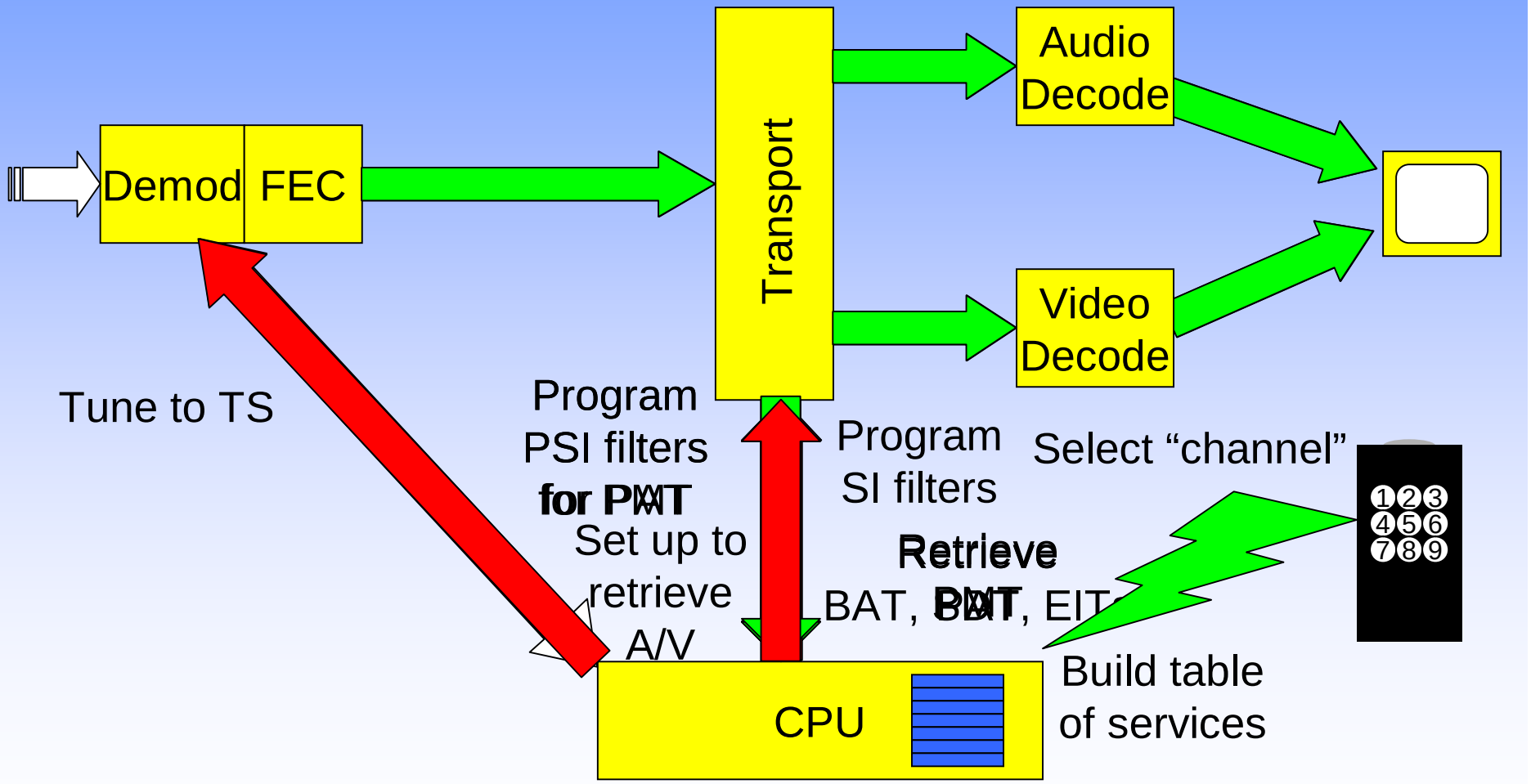
# Selecting a Service by Logical Channel Number



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# Event = Programme

- The DVB term “Event” corresponds to the familiar broadcasting term Programme, e.g. “The News at Ten” or “Terminator 2”.
- DVB enables quite a rich description of events:
  - When it starts, how long it lasts, what it is called, text describing it, attributes characterising it (Football, Movie, Comedy, News, etc.) to allow schedules to be searched by category.



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# Transport Stream Interface: ASI

- Asynchronous Serial Interface (ASI), EN50083-9 (CENELEC), is the DVB interface for Transport Streams
- Unidirectional transport on 75Ω coax (BNC) or optical fibre
- Can use 188- or 204-byte packets



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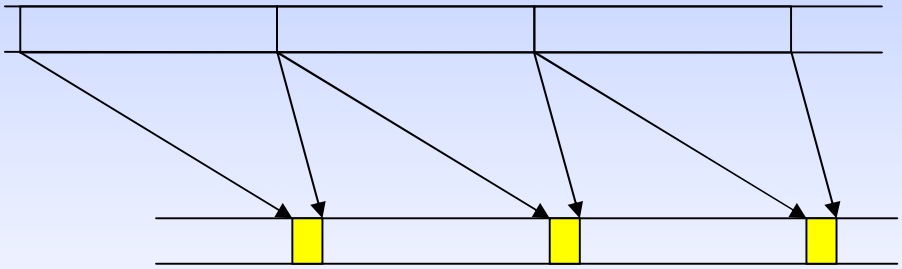
# ASI

- **Uses 270Mbit/s fixed line clock rate**



TS at e.g. 24Mbit/s

ASI stream at 270Mbit/s



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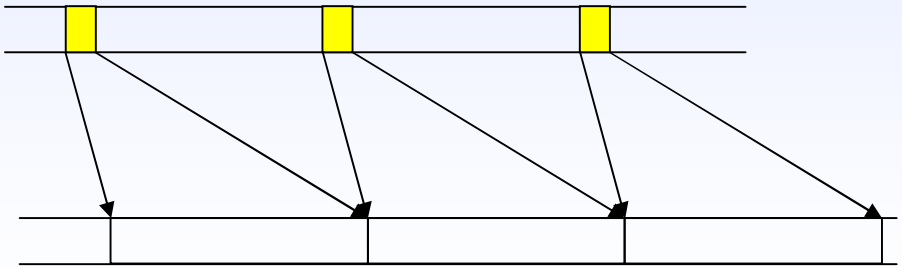
# ASI

- **Carries any transport stream rate without set-up/intervention: receive end regenerates transport stream rate clock from the incoming data**



ASI stream at 270Mbit/s

TS at e.g. 24Mbit/s

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# Transport Stream Interface: ASI

- Burstiness of transmission and size of receive end de-jitter buffer are not defined
- Advisable to check compatibility of equipment



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# Transport Stream Interface: IP over Ethernet

- Increasing use
- SMPTE 2022-2-2007: Unidirectional Transport of Constant Bit Rate MPEG-2 Transport Streams on IP Networks
- Optional use of FEC in a separate stream



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# Distribution options

- IP LAN/WAN
- ASI into dark fibre
- Satellite using DVB-S or DVB-S2
- Microwave link, using DVB-S or DVB-S2
- Network adapter to E3 (34Mbit/s), DS3 (45Mbit/s), E4 (140Mbit/s) or SDH STM1 and SONET OC-3 (155Mbit/s) telco circuits



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# Satellite distribution

- Good for multiple transmitter sites in a Single Frequency Network
- Subject to suitable space segment availability
- Possible problems with sun outage and rain outage



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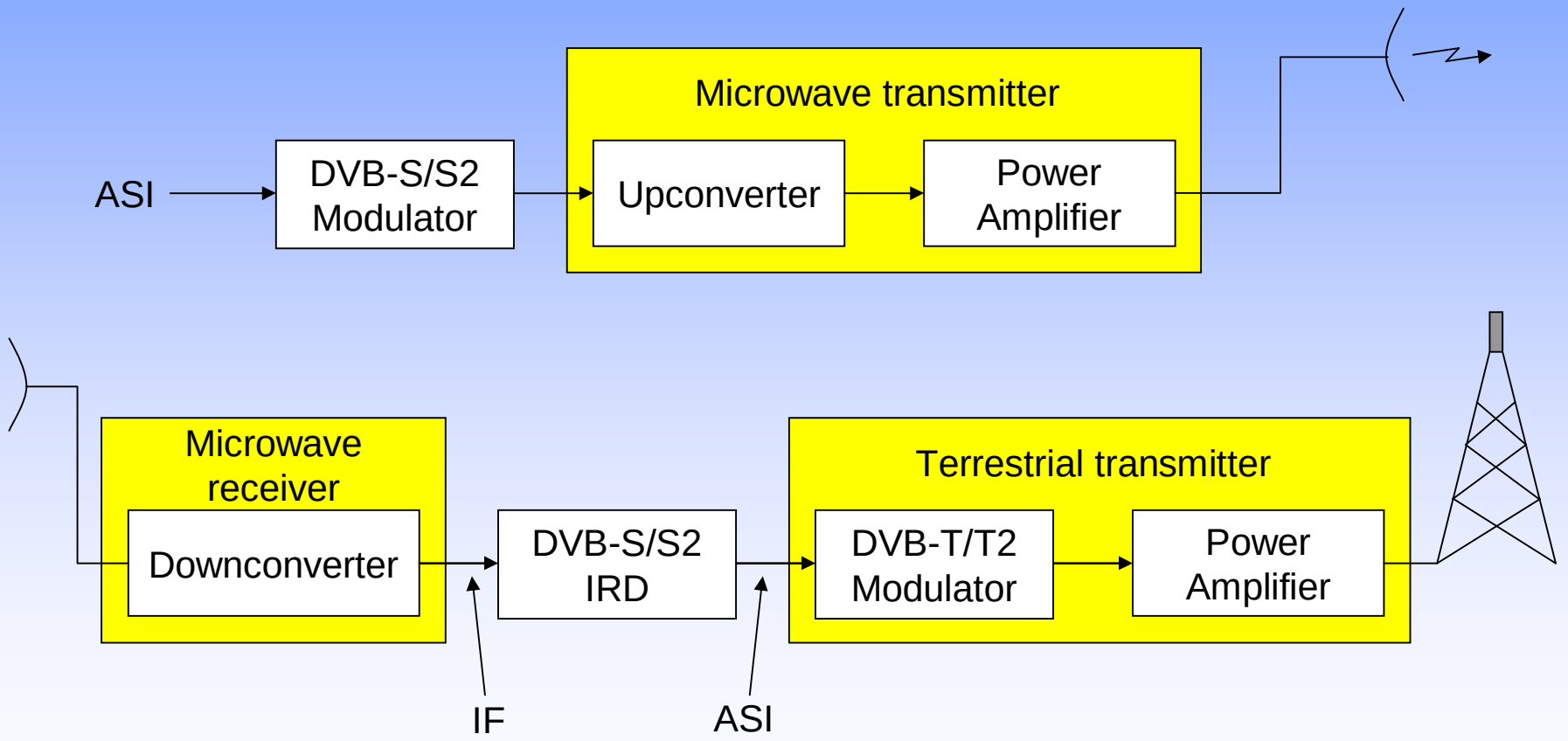
# Microwave link feed



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# Network adapter

- **Playout centre:**
  - **ASI input, network interface, e.g. E3, DS3, output**
- **Transmitter site:**
  - **Network interface input, ASI output**
- **Adapter performs multiplexing of multiple ASI streams, bit-stuffing, etc.**
  - **For an example, see: http://www.arg.co.uk/products/media_combiners.htm**



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# *Any questions?*



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