

# Using ULE for IPv4 / v6 in MPEG-2 encapsulation

*An implementation report*

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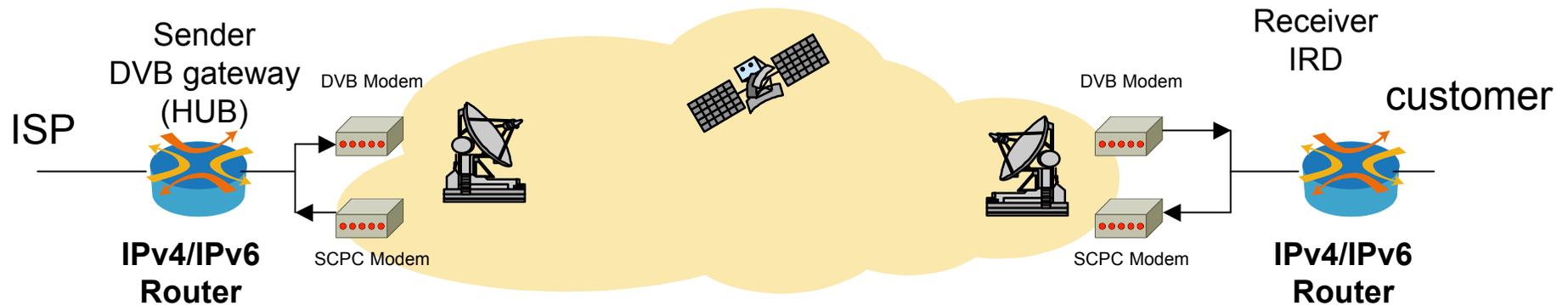
# Satellite Service Provider motivation

- MPE is used for most IP in MPEG-2 encapsulation, but satellite capacity is a VERY expensive resource:
  - MPE adds a lot of overhead for encapsulation
    - 17 bytes of header/trailer for IPv4, 25 bytes for IPv6 (use of LLC/SNAP)
  - ULE (same overhead for IPv6 and IPv4):
    - 9 bytes without destination address field, 15 bytes otherwise

# Motivation continued

- In future, satellite networks should support IPv6 in an efficient and STANDARD way:
  - Easy ROHC support (later)
  - Standard Neighbor Discovery (address resolution)
  - Standard stateless auto-configuration
- A standardized approach is a MUST

# ULE implementation in IPv4/IPv6 access routers



- Satellite link
  - MPEG-2 DVB satellite link
  - SCPC return link (through the satellite)
- IPv4 and IPv6 traffic
- Both DVB-gateway and IRD are IP(v6) routers

# ULE draft (-01) Issues

- Last byte(s) management :
  - Contradictions in text (§5.3 and §5.3.1)
  - Not clear if splitting length and/or end-indicator is allowed
    - Discussion on mailing-list
    - The current proposed text removes ambiguity
- CRC-32 computation details :
  - Computation range (including trailer ?)
    - Do not include trailer.
  - Initial Vector value
    - Possible value of 0xFFFF 0xFFFF
  - Final XOR
    - No XOR

# ULE draft (-01) Issues

- Destination Address Flag missing :
  - Needs to be in the ULE header
  - Suggestions :
    - ➔ Use 'R' flag.
    - ➔ 'R' flag becomes 'D' flag AND reserve another bit in the length field
      - + allows future extension (keep the door opened)
      - MTU goes down from 32K to 16K

# Future plans

- A new draft is needed:
  - Fix the problems detected during implementation
- Implementation:
  - Running code in emulator by 12/03
  - Real DVB environment by 02/04
- Interop tests with another implementation:
  - Scheduled for February 2004 in Salzburg
  - Sponsored by European Space Agency

# Questions ?