empower PAWR Project Office acm sigcomm

theNetworking Channel

QUIC and its impact on secured transport layer management in SATCOM systems

Wed, 19th of January 2022
Time: 8am PDT, 11am EDT, 5pm CET, 1am JST

Context - MYTH overview

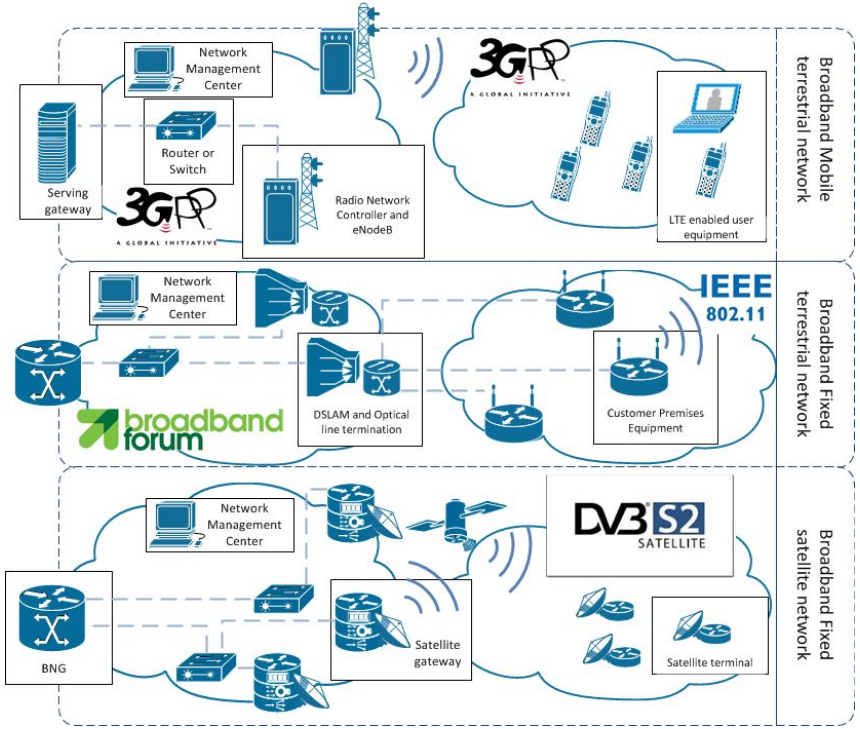
MYTH #1 : SATCOM systems are quite specific

Indeed:

- Limited frequency resource (regulation, etc.)
- Dish alignment
- No standards for network infrastructure (lack of interoperability)

BUT:

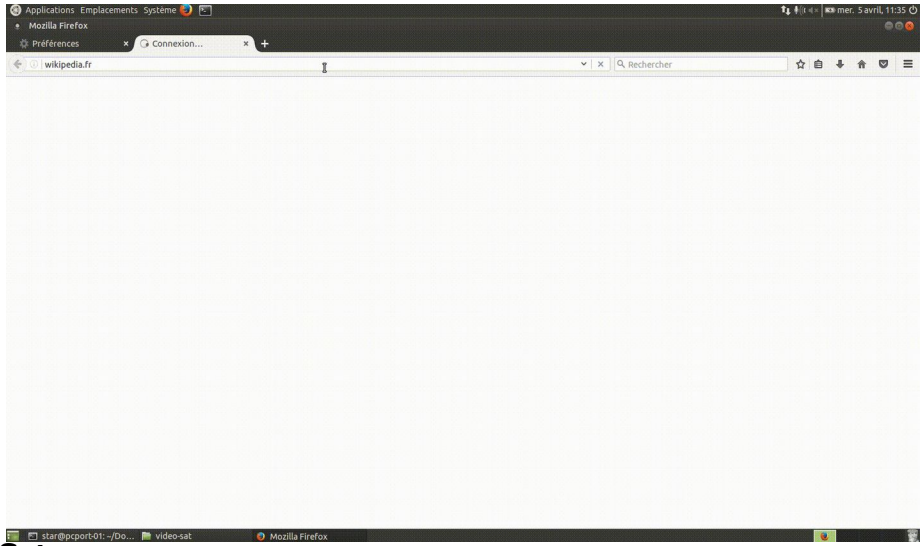
- High level architecture similar to other access networks



Context - MYTH overview

MYTH #2 : There is a huge latency in SATCOM systems

Light page –
Wikipedia type



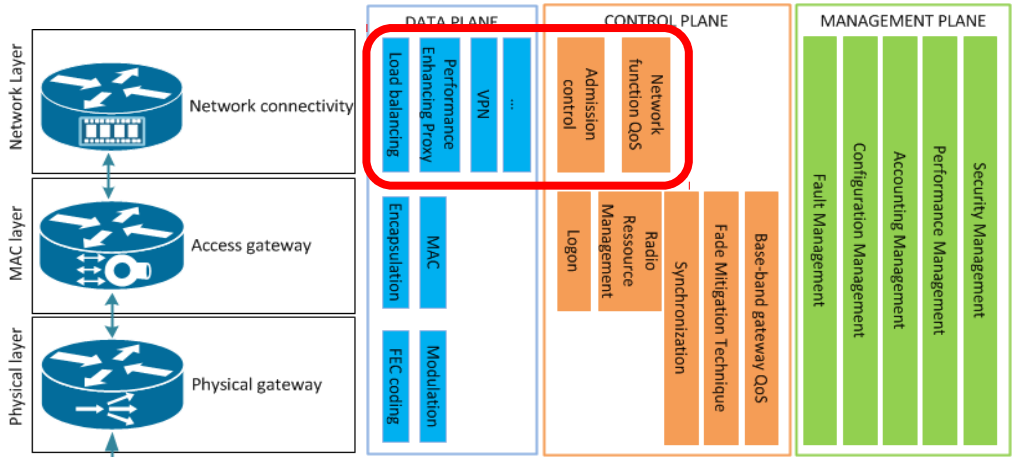
TOOWAY satellite Internet access :

- Solution furnished by ISP ALSATIS with EUTELSAT operator
- 20Mbps download / 6 Mbps upload

Context - MYTH overview

Not a

MYTH #3 : SATCOM systems require ‘middleboxes’



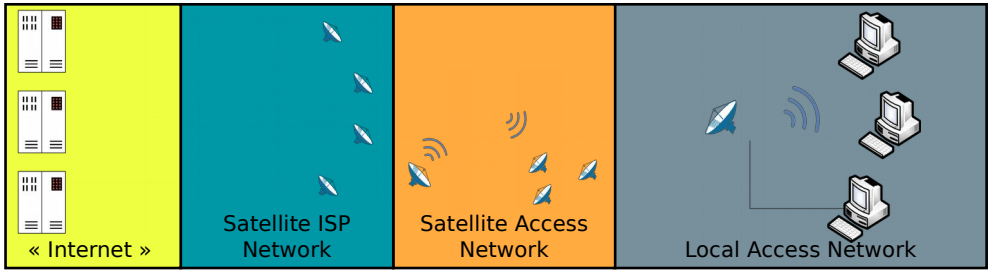
Performance Enhancing Proxy (PEP) – RFC 3135

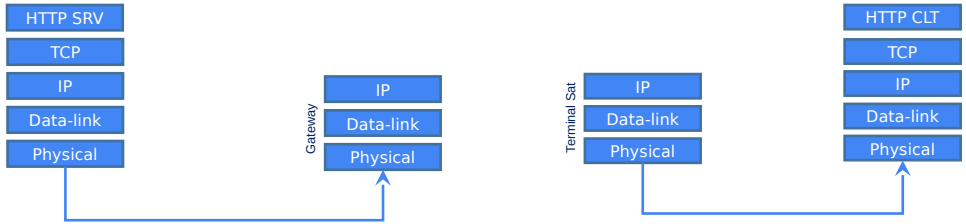
“magic” mix of transport technologies

- Split TCP connections
- Transparent compression

No support of the most recent improvements at the servers or clients

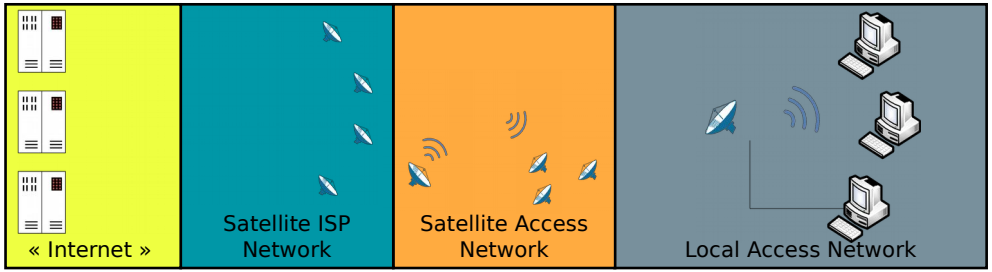
Context - Transport in SATCOM

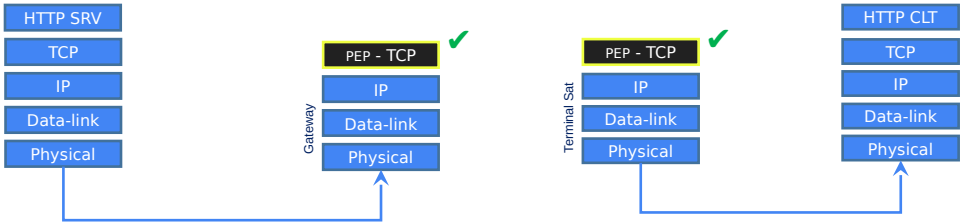


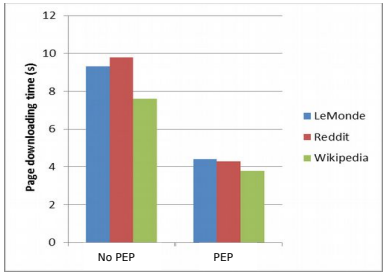


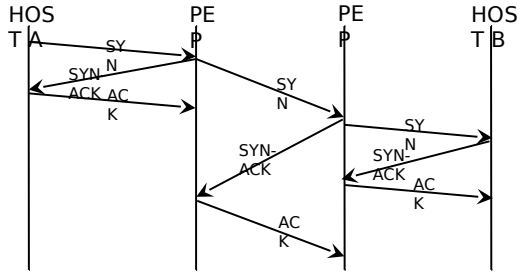
- Connection initialization:
  - Setting up the connection requires three round trips, impacting the moment from which the actual data can be transmitted
- Required window size:
  - To fully exploit the available capacity, it is necessary to increase the sending buffers are the client and the server
- Reliability:
  - Packet loss detection and correction is slow (end-to-end retransmission performance is also affected on GEO access)
- Convergence of congestion control:
  - The exponential increase in data rate is considerably slowed down for a GEO satellite.

Context - Transport in SATCOM









- Connection initialization:
  - Setting up the connection requires three round trips, impacting the moment from which the actual data can be transmitted
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  - [PEP-TCP] Improved by custom TCP buffers in TCP – PEP
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  - [PEP-TCP] Improved by custom TCP initial windows in TCP – PEP

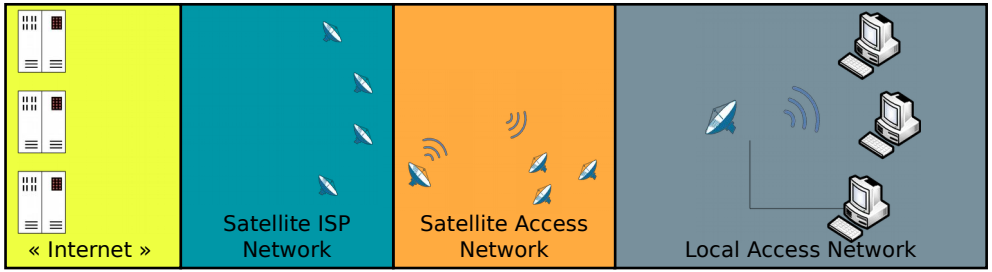
Context - QUIC

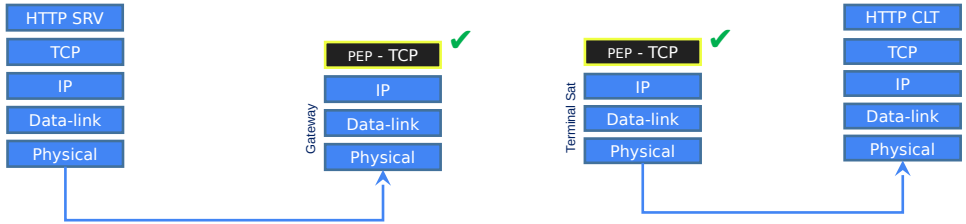
Quick User Datagram Protocol (UDP) Internet Connections (QUIC)

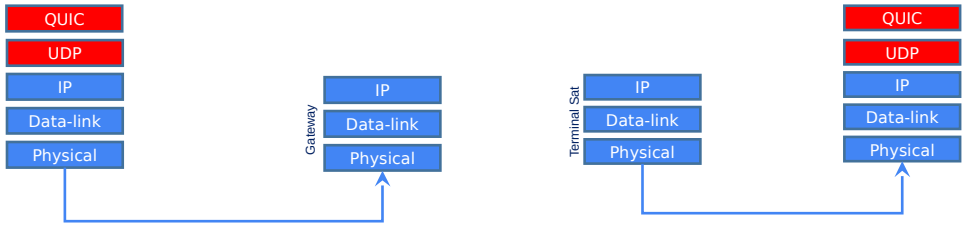
- Deployed for Google services since 2012
- Standardized by IETF in RFC 8999, 9000 and 9001
- Represents +/- 30% of broadband traffic

<table>
<tr><td>Application</td><td>..</td><td>HTTP</td><td>HTTP</td></tr>
<tr><td rowspan="3">Transport</td><td>Confidentiality</td><td>TLS</td><td rowspan="2">QUIC</td></tr>
<tr><td>Flow and congestion control
Reliability</td><td>TCP</td></tr>
<tr><td>..</td><td></td><td>UDP</td></tr>
<tr><td>Network</td><td>..</td><td>IP</td><td>IP</td></tr>
</table>

Context - Transport in SATCOM







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Agenda

- "The Impact of QUIC on SATCOM PEP and Traffic Classification" - John Border, Chi-Jiun Su (Hughes Network Systems)
- "Tuning QUIC to avoid using PEP" - Christian Huitema (Private Octopus)
- "Operational constraints with QUIC" - Isabelle Hamchaoui, Alexandre Ferrieux, Emile Stephan (Orange Labs)
- "Low Earth Orbit impact" - Marie-José Montpetit (Telecom Paris Sud)
- "Open Discussion" - All