Progress on the ‘Network coding and satellites’ draft

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Objectives of the draft

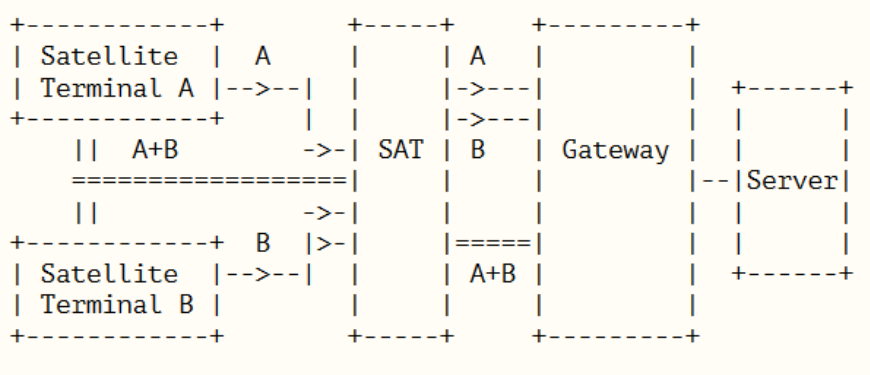
- **Initial objectives of the draft:**
  - Synthetize numerous activities in this context
  - Provide input to build an architecture-oriented document
  - Contributing to a more generic document

- **What the document is actually doing:**
  - ➢ Present the current deployment of network coding in some satellite telecommunications systems
  - ➢ Discuss the multiple opportunities to introduce these techniques at a wider scale

From *-01 to *-03

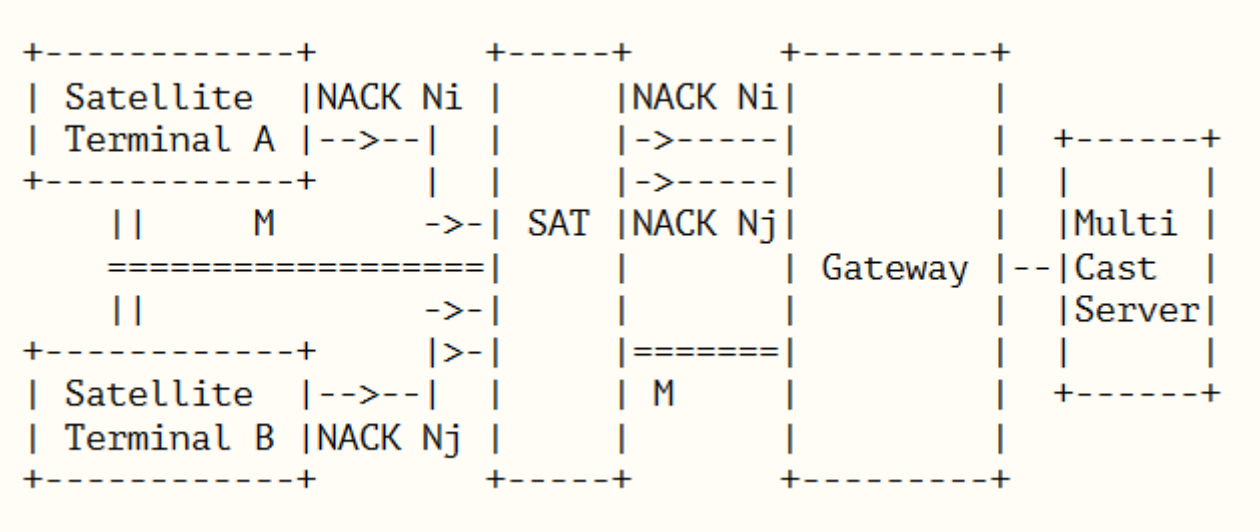
- **Review from Tomaso**
- **Provided content for some use-cases**
  - Two way relay channel
  - Reliable multicast
  - Hybrid access
  - Dealing with varying capacity
  - Gateway handovers
- **Discussed the deployability of the NC in SATCOM**

Two way relay channel



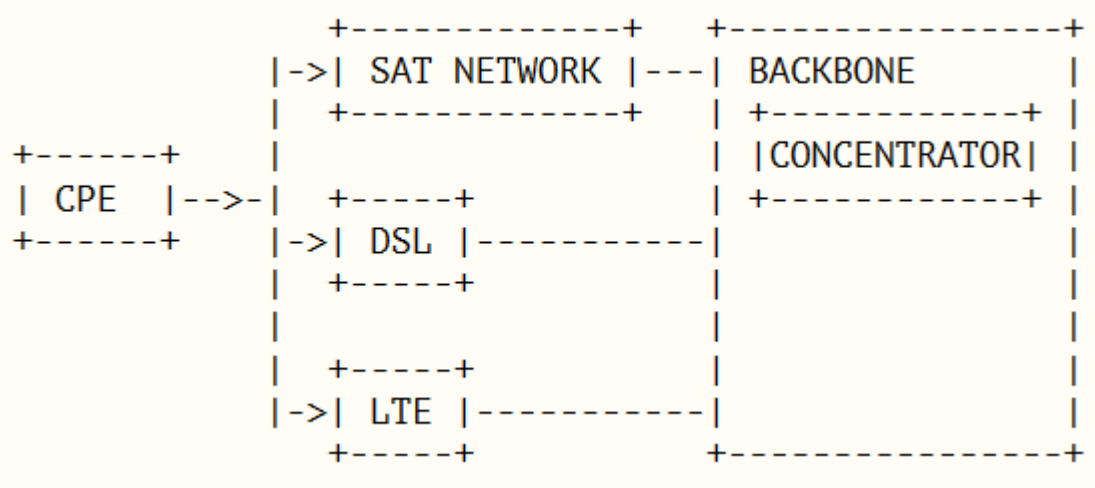
- Two-way communication between end users
- The NC can be either at the ground or satellite level
- Demonstrated at ASMS2010

Reliable multicast



- Adding redundancy to a multi-cast flow
- Could be achieved with NORM but it does not consider other network coding schemes such as sliding window

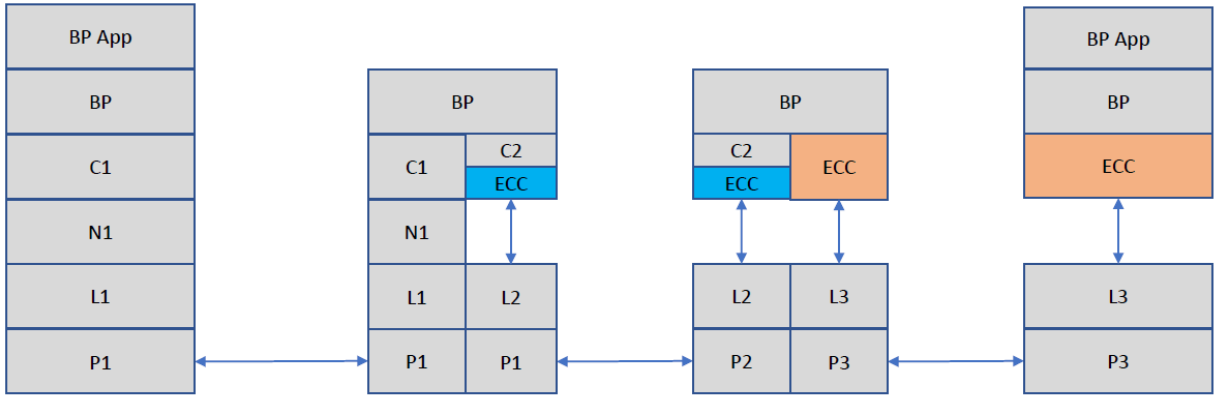
Hybrid access



- Use of multiple path management with network coding at the transport level to either increase the reliability or the total bandwidth
- To cope from packet loss (due to either end-user movements or physical layer impairments), network coding could be introduced in both the CPE and at the concentrator

Delay Tolerant Network architecture

- TBD (in *-04)
- In the mean time:



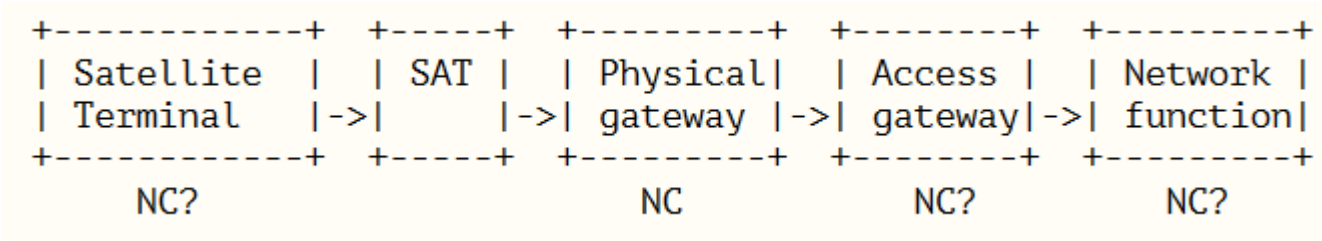
ECC (network coding) could be:

- **Underneath a “convergence-layer” (blue)**
- **Underneath the bundle protocol (orange) within a convergence layer**

This raises discussions on:

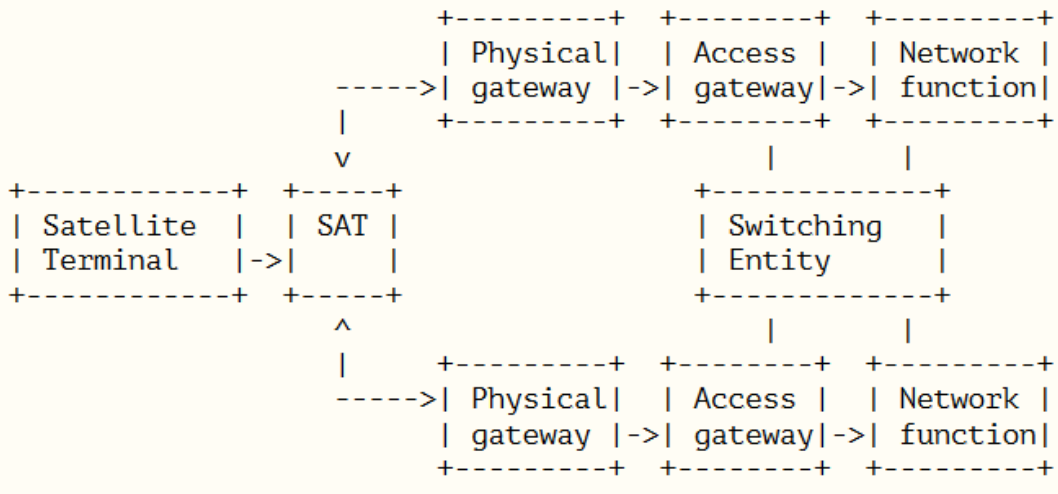
- **Interactions with ARQ layer 2 mechanims**
- **Interactions with congestion control mechanisms within the convergence layer**

Dealing with varying capacity



- **Use network coding to overcome cases**
  - where the wireless link characteristics quickly change overtime
  - where the physical layer codes could not be made robust in time

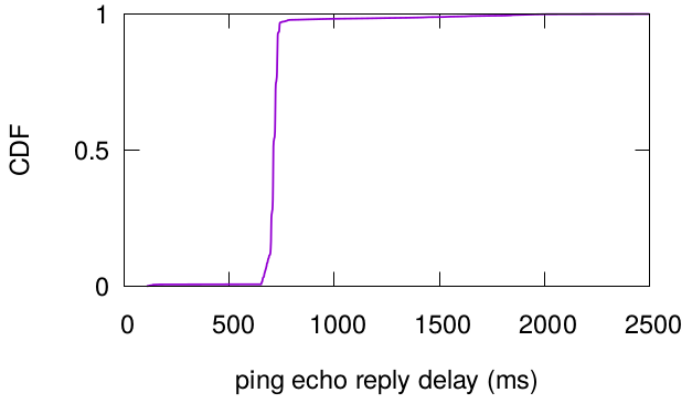
Gateway handovers

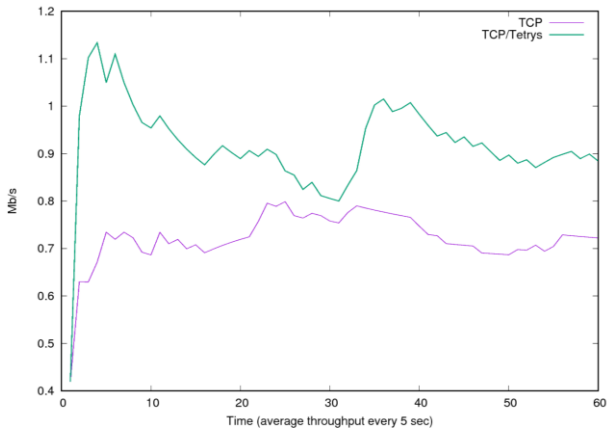


- Gateways may not be properly synchronized => packet loss
- Network coding can be added to improve the reliability of the transmission and propose a seamless gateway handover

TETRYS PERFORMANCE EVALUATION

- CESARS: CNES platform for hosting SATCOM related experiments
- TETRYS evaluation with a fixed public SATCOM Internet Access





- TCP/TETRYS results in better exploitation of the available satellite resource

Deployability of the NC in SATCOM (and not only)

- **NC level applicability (OSI) : depends on the use-case**
- **What NC to apply : depends on the use-case**
- **Architecture for hosting NC functions: depends on the use-case**

- **For one selected use-case:**
  - Virtualized infrastructure could help to deploy NC schemes
  - Interactions with other working groups ?

What is next?

- **Initial objectives of the draft:**
  - Synthetize numerous activities in this context
  - Provide input to build an architecture-oriented document
  - Contributing to a more generic document

- **What the document is actually doing:**
  - ➢ Complicated exercice due to the variability of the use-cases

- **Next:**
  - Further detail the use-cases ? (we need to have consistency in the level of details in the different use-cases)
  - Map what WG's NC proposals are relevant for the proposed use-cases?
  - Any industrial interest ? (SATCOM equipment provider, SATCOM operators)