Mitigating Interference in the Network Status Carrier ID Standardization

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SHAPING THE FUTURE OF SATELLITE COMMUNICATIONS

Agenda

- Mitigating Interference in the Network
- Status Carrier ID Standardization

DVB-S2 Adaptive Coding and Modulation (ACM)

Bad weather conditions

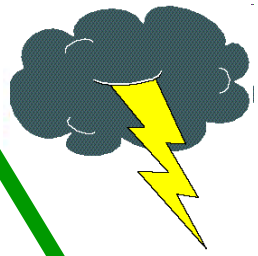
ModCod: 8PSK 5/6

Throughput 36MHz : 73 Mbps

Good weather conditions

ModCod: 32APSK 9/10

Throughput 36 MHz: 120 Mb/s



Can this technology be applied to reduce impact of RFI ?

ACM Controller

ACM client

Modulation

Demodulation

Feedback mechanism (terrestrial or satellite)

* Typical improvements

The answer is …”depends”

Yes … RFI impacts QoS “similar” like rain fades do

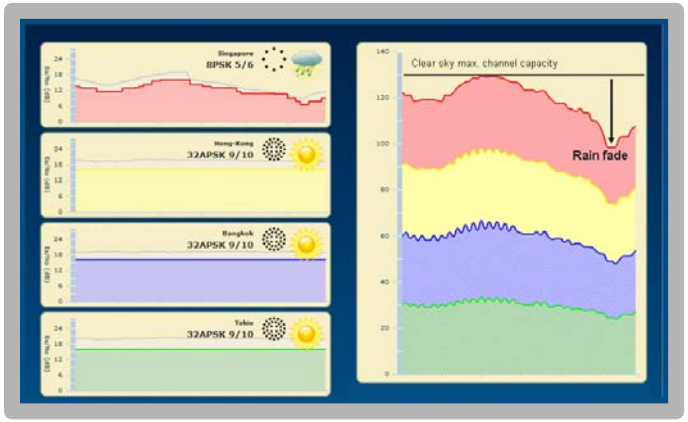
But … RFI is different in a sense that the impact is

- Not regional like rain fades are
- Also occur on C-Band

… so the benefits of ACM really depend on:

- The ACM implementation (algorithm)
- Type of Services
  - » Fixed bitrate (live video)
  - » Variable bitrate (video files, IP, …)

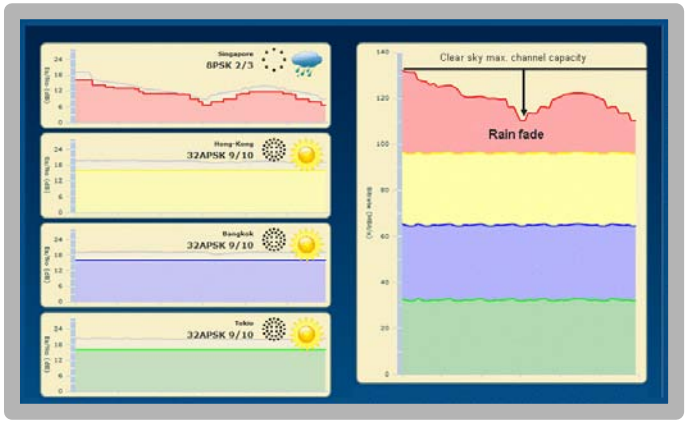
How traditional ACM use cases react on RFI



FlexACM Shared Rate (Classic ACM)

- Drops in link quality affect service rates of other sites.
- Services (can be but don't have to be) mapped in same ISSY
- Works only for variable bitrate services (video files, IP data)

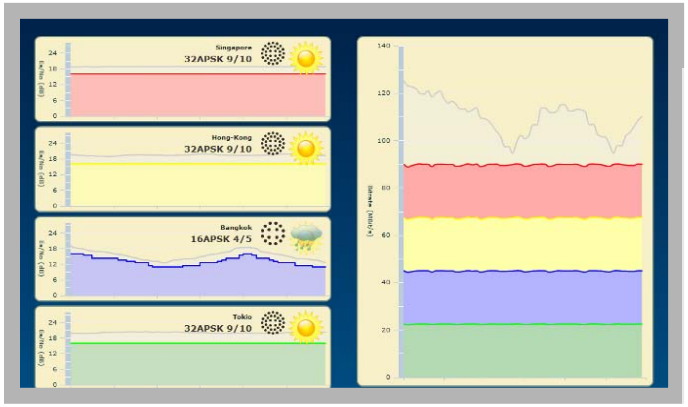
➔RFI impacts 'all' locations, so this ACM scenario may reduce impact of RFI for variable bitrate services



FlexACM Independent Rate

- Drops in link quality do NOT affect service rates of other sites
- Separate ISSY for every terminal or "Service Group" (regional bouquet)
- Allows geographical statistical multiplexing on wheather conditions

➔ Less applicable since many locations affected at the same time by RFI



FlexACM Fixed Rate (e.g. video)

- Drops in link quality does not affect any service rate & are buffered by margin
- The margin and CIR is dependent on impact of RFI
- Margin can be used for opportunistic data (variable bitrate)

➔ Less applicable since difficult to estimate required margin for RFI interferences

Conclusions

- ACM can be useful to reduce the impact of RFI
- Networks with ACM are more robust against RFI
- Best fit for variable bitrate services
  - Data applications
  - Video applications with variable rate
    - File transfers
    - X-layer video optimized services (e.g. SNG)

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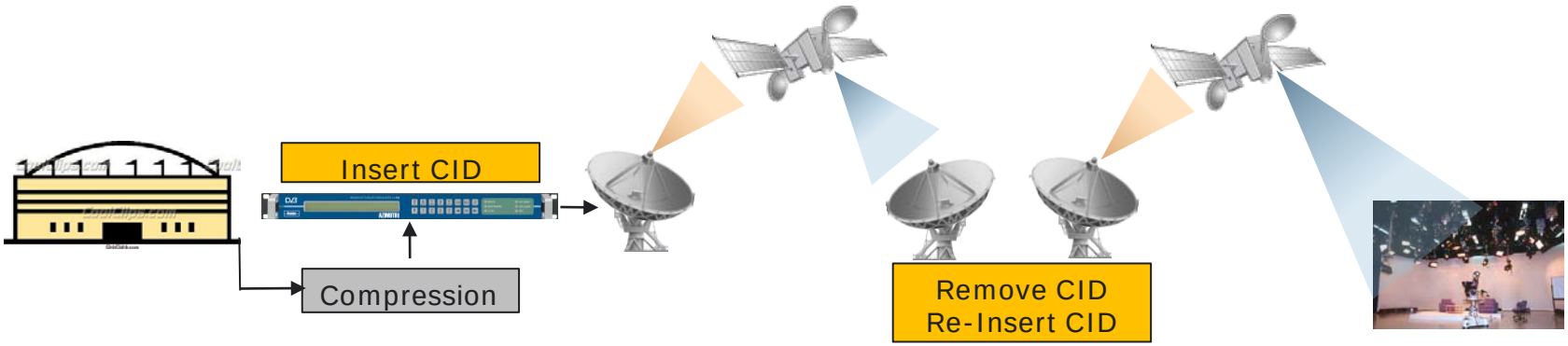
Status Carrier-Identifier (CID) Standardization

- A carrier identifier (Carrier ID) is inserted in the uplink modulator or SNG encoder/modulator



- Two versions of Carrier ID in video and data applications :
  - NIT Carrier ID: faster adoption in the industry
  - RF Carrier ID : slower adoption in the industry

- Each version has it advantages and disadvantages

RF CID versus NIT CID : Complementary technologies

	NIT Carrier ID	RF Carrier ID
Standards Availability	WBU-ISOG specification (2009) (No MAC address in CID)	DVB expects standard end of 2012 (Requirements and specs are under definition)
Transponder and Carrier Compatibility	Requires MPEG-TS (~Video) * Broadcast Contribution * Broadcast Distribution	Agnostic to traffic carrier or transport mechanism * Video and Data transport focused
Changes to original signal	Yes (NIT table)	“None”, second carrier is overlay to the original carrier
Robustness	Low - CID not recoverable if main carrier is down	Higher, can be decoded even if main carrier is jammed
Injection point	Modulator or (SNG) encoder	Modulator
ACM and ULPC compatibility	Yes	Yes
Carrier ID decode speed	Typical 2 seconds (25msec-10sec)	May take up to 1 minute
Cost of modulator	“No” additional cost	Higher
Cost of decoder	“No” additional cost	Higher (dedicated equipment)
Network Access to Carrier ID	Everywhere the network, even on any IRD and set top box	By satellite operator predominantly (Dedicated decoder receiver required)
Ease of deployment	Modulator : SW upgrade OTS TS analysers/monitoring eq. IRD’s in the future?	Mod : SW upgrade only ? Dedicated Receiver/Decoders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