

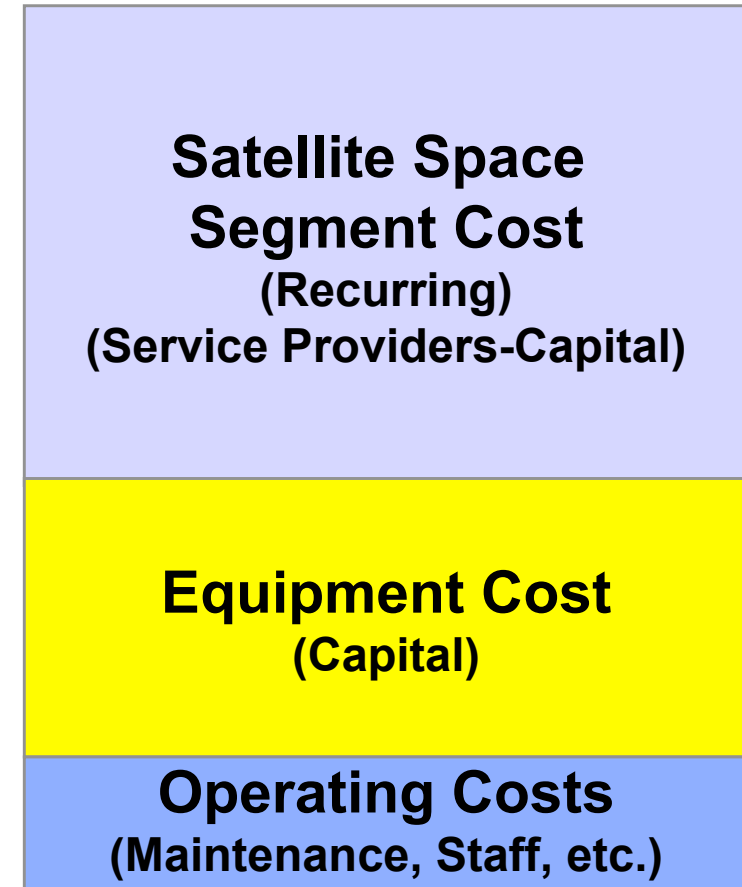
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# PCMA-Paired Carrier Multiple Access (Bandwidth optimizer)



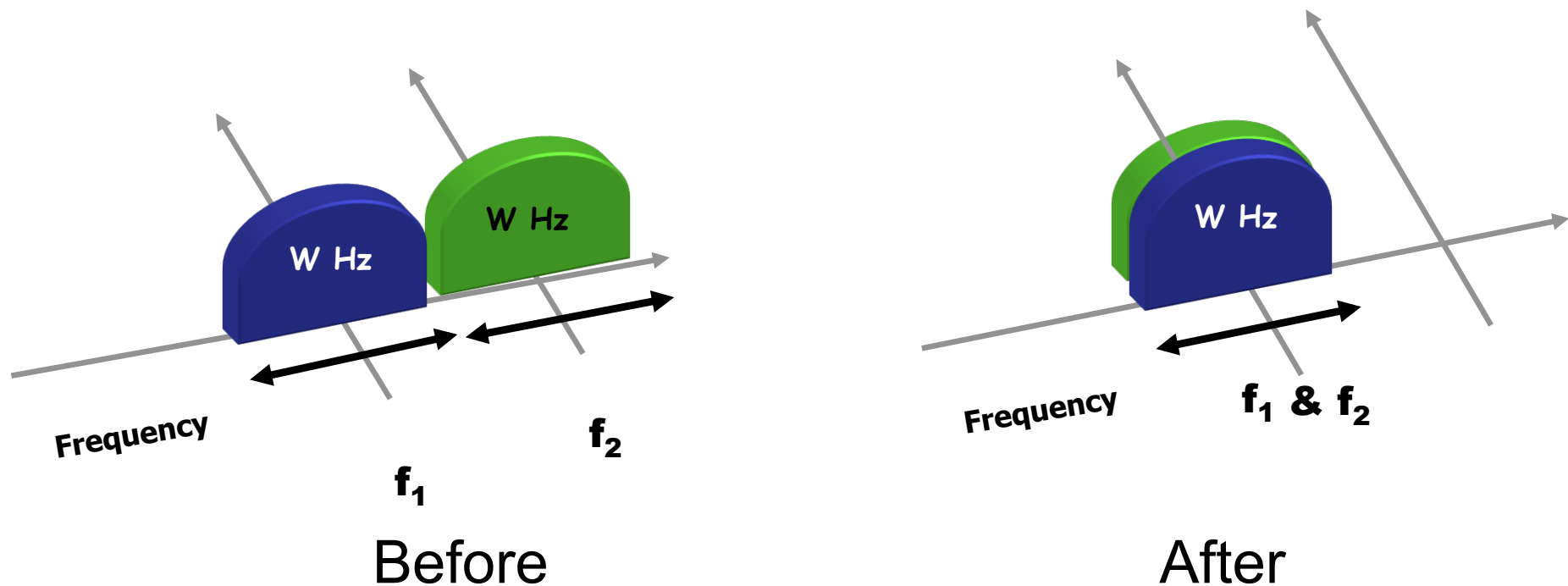
# Typical Network Budget

- Three factors in determining total cost of ownership
- Space segment costs can dominate
  - ▶ especially true for medium and high-capacity full-time circuits
- Bandwidth and power efficiency are key
  - ▶ modem efficiency has improved...
  - ▶ “add-on” ViaSat technology can further boost current system performance and reduce operational costs even more...



# Signal cancellation = BW savings

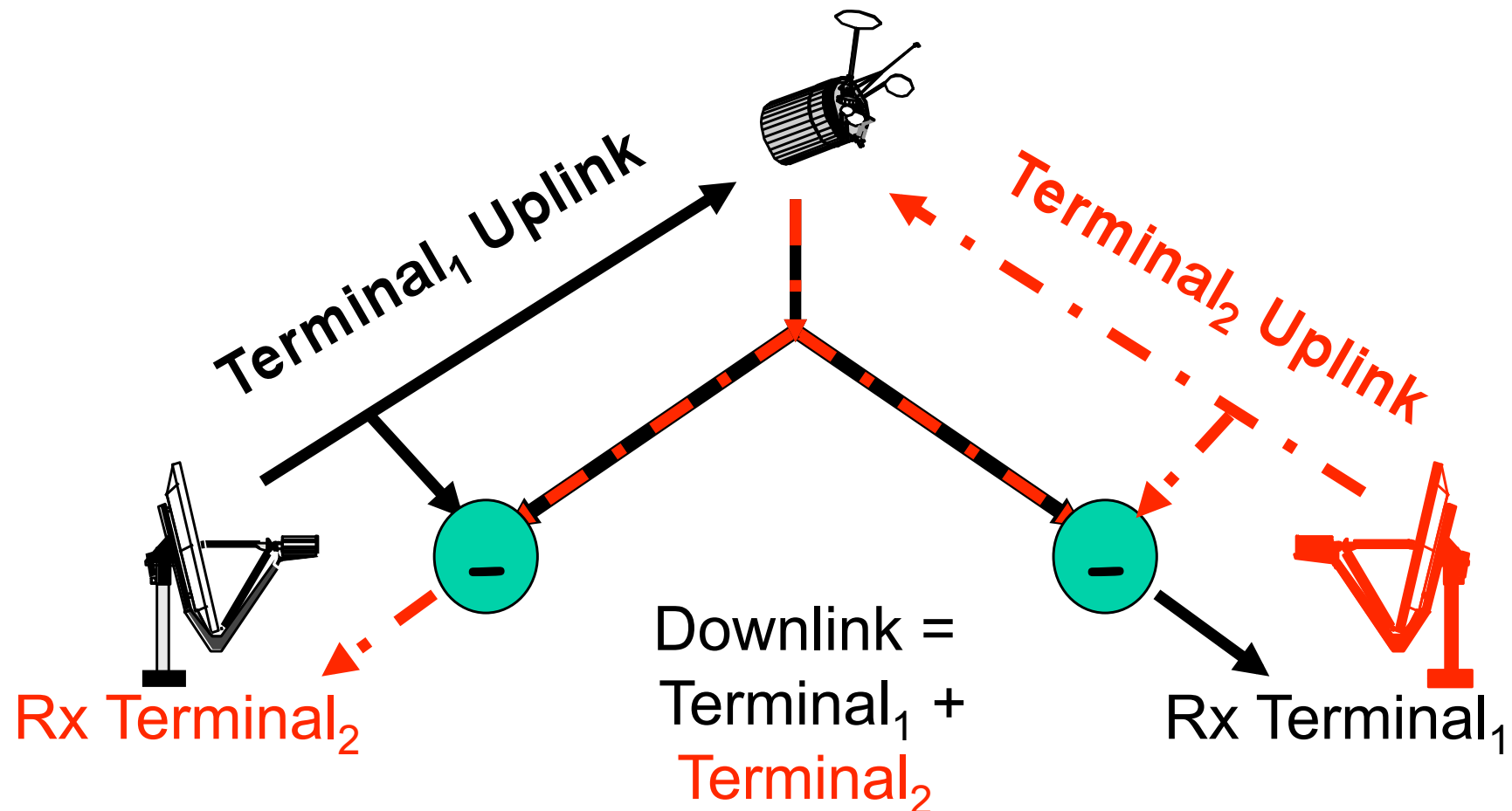
- Patented ViaSat PCMA technology allows 2 different satellite signals to operate on the same frequency



- Bandwidth savings can be as much as 50% !!
- Applicable to any modulation / FEC technique

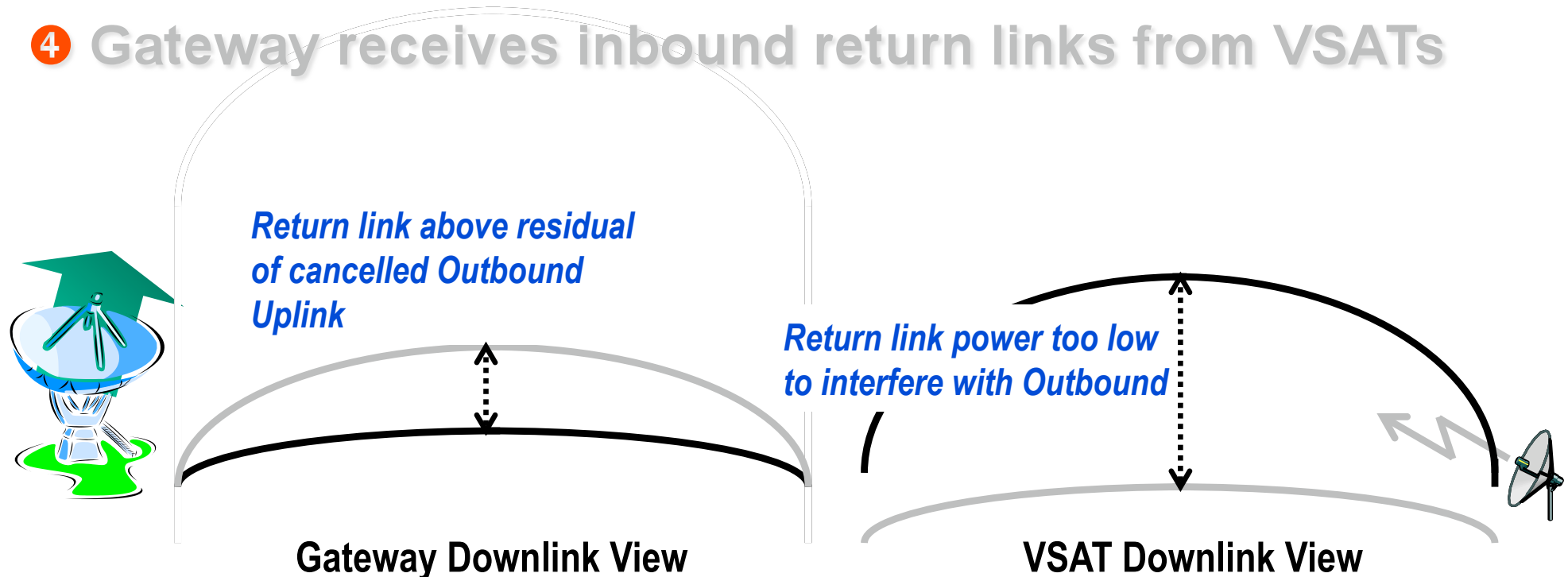
# PCMA – How It Works

- Overlapping uplink signal is subtracted to get desired downlink signal



# Hub Cancellor (Asymmetric PCMA)

- 1 Gateway transmits Uplink signal
- 2 Gateway cancels its received signal
- 3 Subscriber Terminal transmits a return link
- 4 Gateway receives inbound return links from VSATs



# PCMA Product Overview



- Compatible with existing modem technology
  - ▶▶ Modulation: BPSK, QPSK, 8-PSK, 16-APSK, 16-QAM
  - ▶▶ FEC: Sequential, Viterbi, Reed-Solomon & Turbo product codes
- Interfaces at IF between modem & RF chain
  - ▶▶ Easy add-on with plug-n-play installation
  - ▶▶ Operates at hub site and remote end-user locations
- Broadband operation
  - ▶▶ .5 MHz to 36 MHz cancellation
- Easy “no-brainer” purchase decision
  - ▶▶ ROI payoff between 2 to 6 months
  - ▶▶ Product available in 2Mhz, 5Mhz, 10Mhz, 20Mhz and 36Mhz

# More Product Details

- Key attributes
  - ▶▶ Cancellation BW: .5 MHz to 36 MHz
  - ▶▶ 70 MHz IF (52 to 88 MHz), supports C or Ku-band systems
  - ▶▶ 25 dB min forward carrier signal cancellation
  - ▶▶ Compact (1 RU 19 inch rack mount)
  - ▶▶ Front panel and remote control (Ethernet) interface
- Redundancy switch configurations (1:1 and 1:8)
- Broad product compatibility and Modem Agnostic
  - ▶▶ Comtech/EF Data
  - ▶▶ Radyne/ComStream
  - ▶▶ Paradise
  - ▶▶ Advantech
  - ▶▶ Others



**Optimize your Future and legacy links today!**

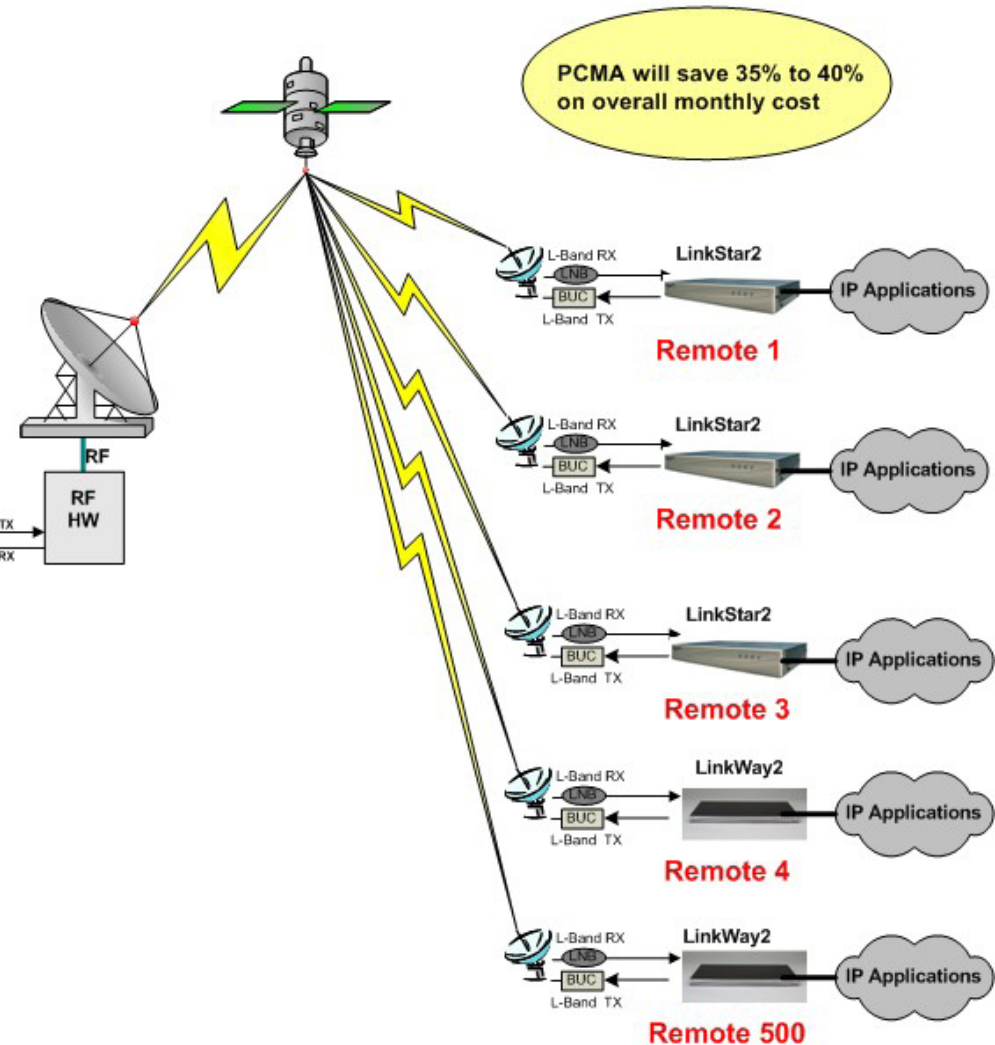
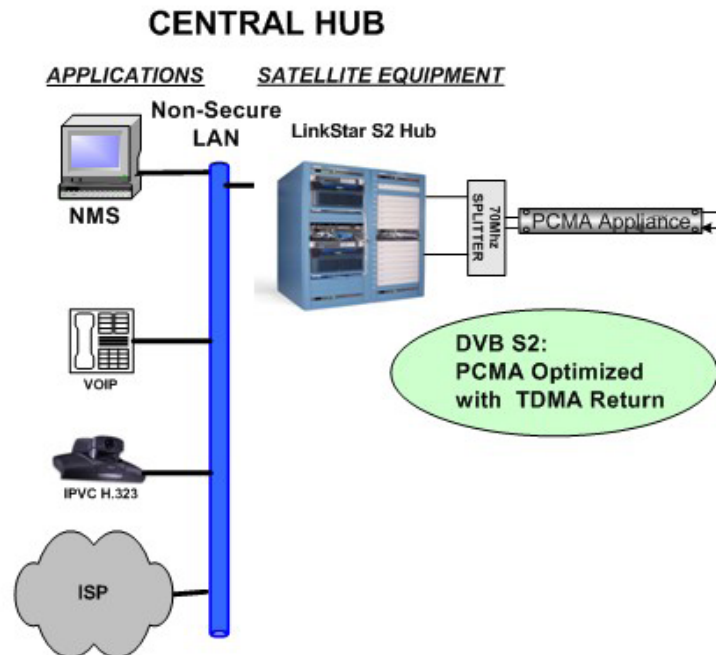
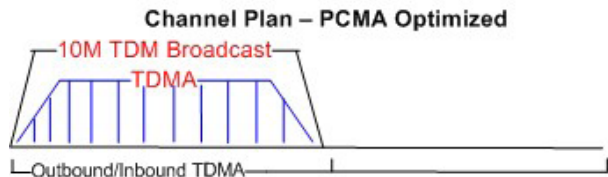
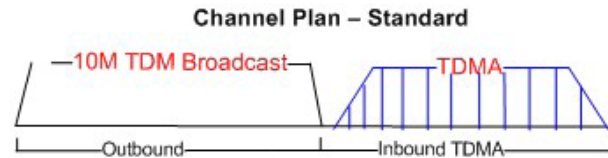
# Operational Considerations

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- Link requirements
  - ▶▶ Full-duplex circuits only (symmetric or asymmetric)
  - ▶▶ Must be able to receive your own uplink signal (doesn't work with cross-strap transponders)
- Implementation considerations
  - ▶▶ Power is slightly increased over standard frequency pair approach (0.15 to 0.5 dB depending on near/far ratio)
  - ▶▶ May need to change existing coding rates and modulation to take advantage of bandwidth reduction
    - ▶ Link budget analysis will determine link configuration and estimated overall savings of power and bandwidth with PCMA
  - ▶▶ New services can be designed to maximize savings (e.g., optimal antenna size)
- Products
  - ▶▶ DAMA – StarWire
    - ▶ 64 kbps - 2 Mbps SCPC modem integrated into network
  - ▶▶ Hub Cancellor
    - ▶ Hub-Spoke – ArcLight (Broadband, Gov. programs)
    - ▶ High-speed trunking Point-to-point

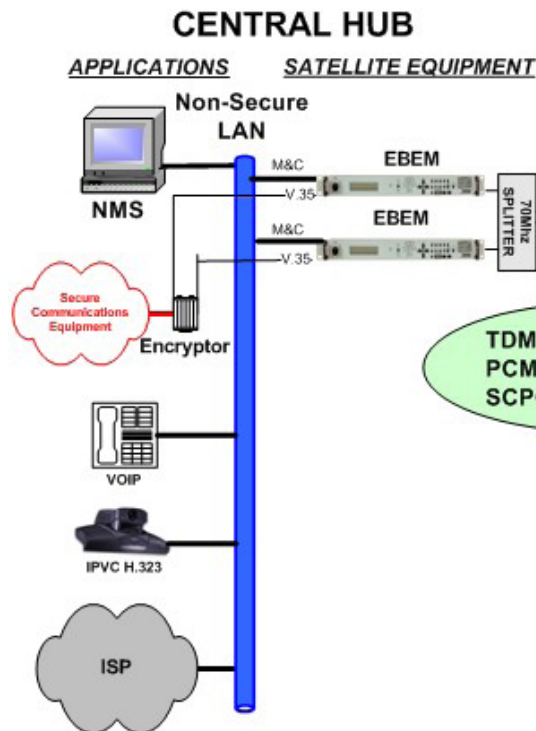
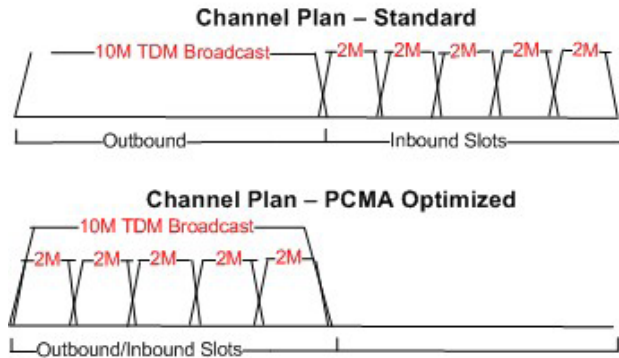
# Asymmetric PCMA in a DVBS/S2/TDMA Network

## ViaSat PCMA DVBS2 Overlay

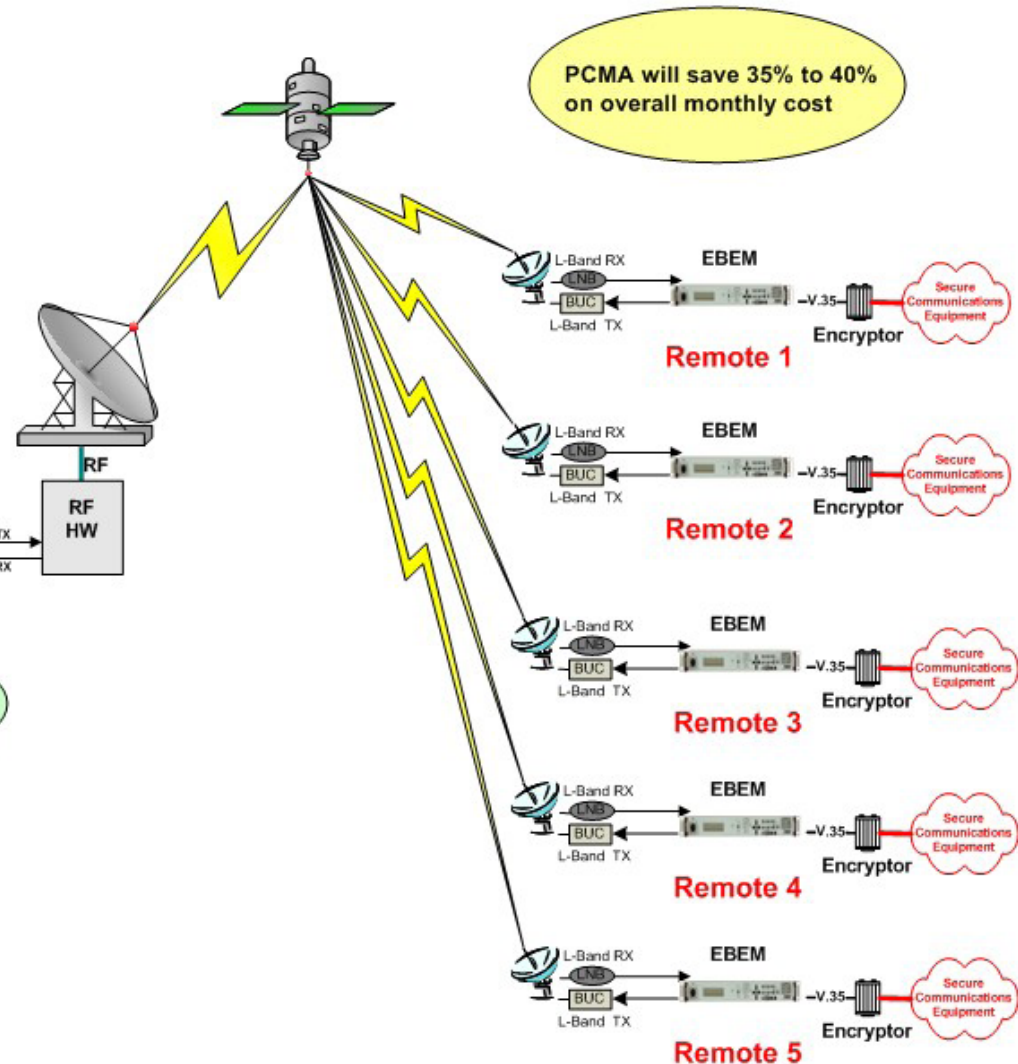


# Asymmetric PCMA in a TDM/SCPC returns

## ViaSat PCMA TDM/SCPC returns

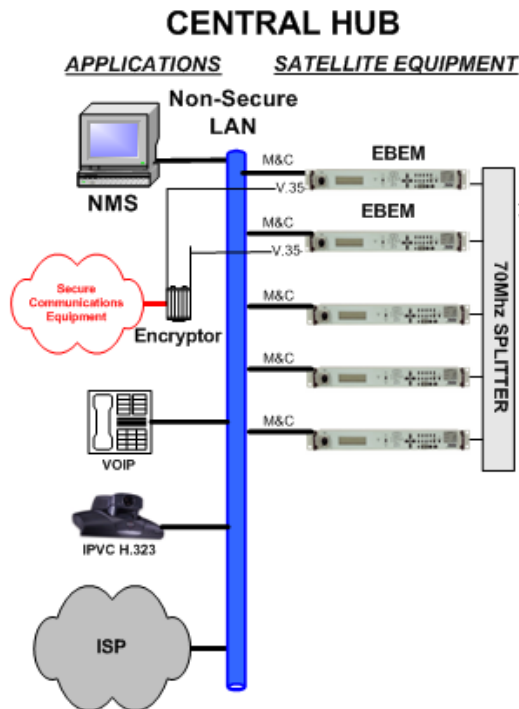
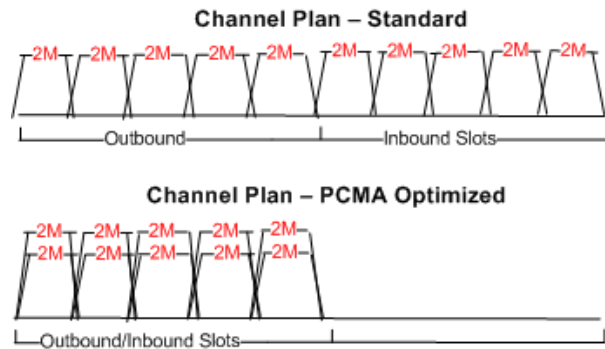


TDM:  
PCMA Optimized with  
SCPC Return

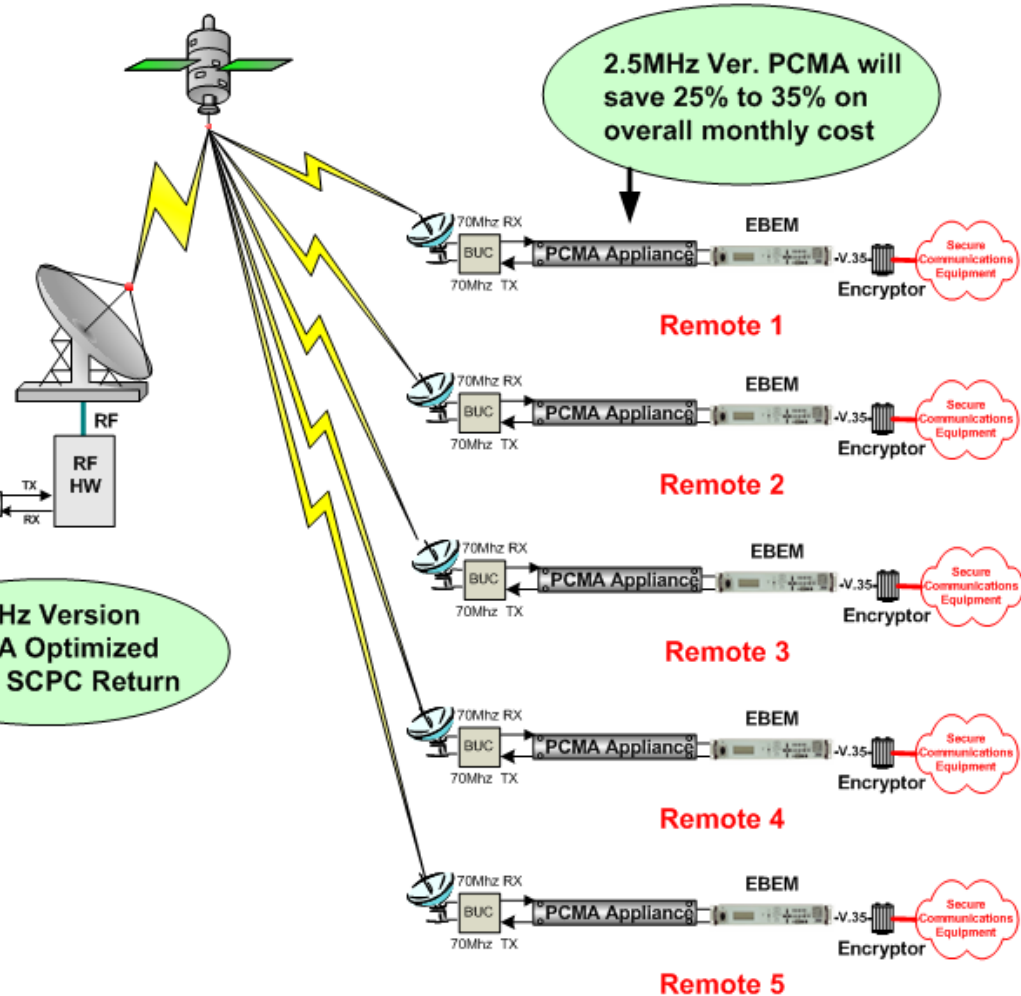


# Symmetric PCMA in a SCPC Point to Point

## ViaSat PCMA SCPC Symmetric SCPC returns



10 MHz Version PCMA Optimized with SCPC Return



# Product Roadmap / Evolution

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- Need L-band added to go after Tactical remote side in Symmetric SCPC links. (Best would be 70/140/L-Band)
- Develop 54Mhz Version
- Develop 72Mhz Version
- Need market feed back on missing features, we should have a study performed or have Comsys do for us...
- Develop higher speeds in the OC3 area (Reason for 72MHZ)
- Leverage OEM and volume to maintain competitive pricing and high margins