

# PCMA HUB CANCELLER SOLUTION OVERVIEW

## Echo Cancellation Applications over Satellite

With the addition of a satellite echo canceller to an ST Engineering iDirect network, a service provider can increase network capacity, free up bandwidth for new applications, reduce operating costs and boost current system performance.

Due to a limited amount of bandwidth available in certain markets and the rapid emergence of bandwidth- heavy applications, an echo canceller can be an ideal solution for any network that is capacity constrained or needs a bandwidth improvement. Specific applications that may benefit greatly include:

- Cellular Backhaul
- Energy & Utilities
- Oil & Gas
- Enterprise Connectivity
- Education/Training
- Business Continuity
- Maritime

**VELOCITY**

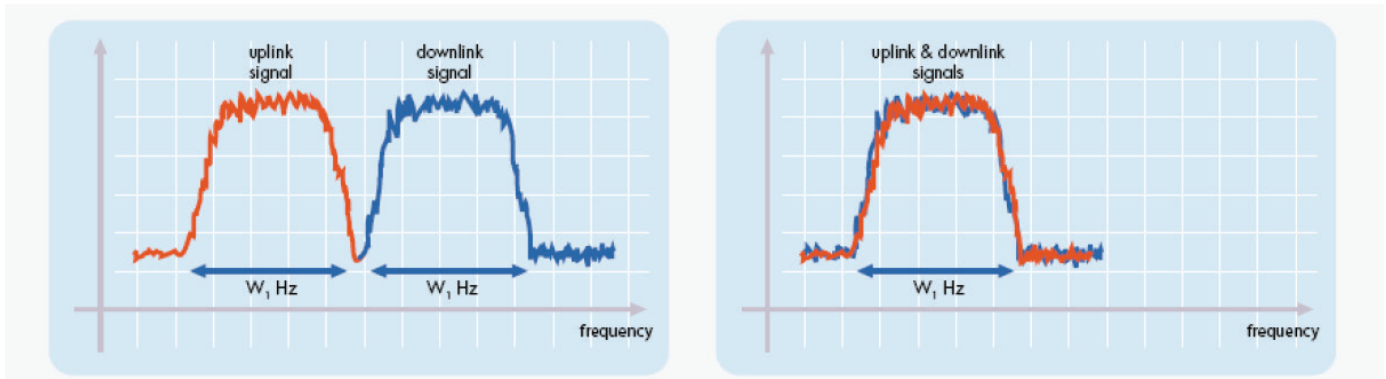
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## Paired Carrier Multiple Access

The echo cancellation used in the PCMA Hub Canceller is a Paired Carrier Multiple Access (PCMA) technology that is designed to reduce the satellite bandwidth needed by up to fifty percent. This is accomplished by combining the uplink and downlink transmissions into the same bandwidth, thus allowing two different signals to overlap in frequency and increase the bandwidth available to the system.



The transmit and receive carriers of a duplex link are superimposed on top of each other and the hub Canceller receives the combined signal and applies an adaptive, self-interference cancellation technique to subtract the transmitted signal to recover the inbound signals.

Since the PCMA Hub Canceller operates on the IF layer and does not demodulate the signal, it can be used with any modulation type or FEC in the Ku- or C- bands and therefore allows simple equipment and software upgrades.

## Point-to-Multipoint Networks

In a Point-to-Multipoint scenario, only one echo canceller is needed and it is located at the hub. The PCMA Hub Canceller relays the outbound carrier that goes to all of the remote sites. In turn the remote sites generate return carriers that are inserted into the same transponder spectrum that the outbound carrier is on. The outbound carrier contains the multiple smaller inbound signals, thus reducing the bandwidth needed for the additional lower data-rate return channels. Since only the space segment required by the outbound broadcast is required, a typical result of bandwidth savings of 25%-45% is seen.

At the remote sites, no cancellation is necessary since the return carriers are just recognized as interference or noise compared to the outbound carrier. Maximum savings can be achieved when the inbound carriers already fit into the frequency span of the outbound carrier.

## Our Solution

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The echo cancellation works in both Evolution DVB-S2 and DVB-S2X networks and can further boost savings and efficiency of DVB-S2/ DVB-S2X technology. The echo cancellation technology also increases the economic viability of spread spectrum networks and provides increased security by hiding upstream carriers under the downstream, thus preventing detection.

Due to the complexity of configurations when it comes to network design and link budget factors like MODCOD and data rates, ST Engineering iDirect provides the link budget analysis as well as mandatory installation and configuration of the VPCMA. We add value to PCMA Canceller applications by doing link budget analysis, employing safe mode configuration, and providing installation services.

## System Design Considerations

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The PCMA Hub Canceller is available in 2MHz, 5MHz, 10MHz, 20MHz, 36MHz models and in 1:1 redundant configuration for 10MHz and above. A redundant configuration is highly recommended. We provide the mandatory installation, run link budgets to determine if the solution is a proper fit for the customer and provide TAC support.

Bandwidth savings can vary based on location, hub antenna size, available EIRP and other link budget parameters. Network design considerations should include:

- Transponder power should be bandwidth limited to power balance
- No cross-strapped transponders allowed, must operate in loopback transponder only so each remote can receive the correct carrier,
- Requires powerful beams (min. EIRP 48dBW in Ku-Band, 38dBW in C-band)
- Minimum typical hub size: 4.8m Ku-, 7.2m C-band antenna (the larger the hub antenna, the more efficiently PCMA works, resulting in more bandwidth savings)
- L Band to 70 MHz frequency converters