

## DoubleTalk Carrier-in-Carrier Overview

Carrier-in-Carrier is based on Applied Signal Technology’s DoubleTalk bandwidth compression technology. DoubleTalk uses “Adaptive Cancellation,” a patented technology that allows the transmit and receive carriers of a full-duplex satellite link to be transmitted in the same transponder space.

When combined with advanced forward error correction and modulation techniques, DoubleTalk Carrier-in-Carrier can deliver unprecedented operating expense savings.

In addition to operating expense (OPEX) savings, DoubleTalk Carrier-in-Carrier can also provide capital expenditure (CAPEX) savings by allowing a smaller BUC/HPA and/or antenna.

Figure 1 shows the typical full-duplex satellite link, where the two carriers are adjacent to each other. Figure 2 shows the typical DoubleTalk Carrier-in-Carrier operation, where the two carriers are overlapping, thus sharing the same spectrum.

When observed over a spectrum analyzer, only the Composite is visible. Carrier 1 and Carrier 2 are shown in Figure 2 for reference only.

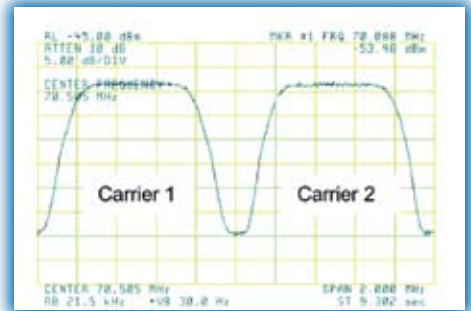


Figure 1:  
 Without DoubleTalk Carrier-in-Carrier

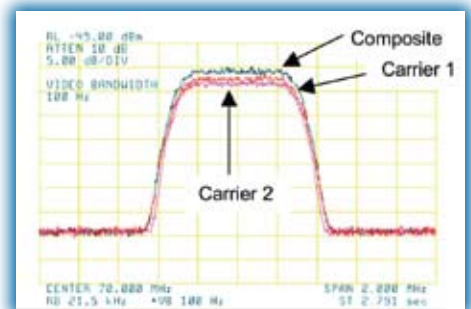


Figure 2:  
 With DoubleTalk Carrier-in-Carrier

## A New Dimension in Bandwidth Efficiency

DoubleTalk Carrier-in-Carrier is complementary to all advances in modem technology, including advanced FEC and modulation techniques. As these technologies approach theoretical limits of power and bandwidth efficiencies, DoubleTalk Carrier-in-Carrier (utilizing advanced signal processing techniques) provides a new dimension in bandwidth efficiency.

DoubleTalk Carrier-in-Carrier allows satellite users to achieve spectral efficiencies (i.e. bps/Hz) that cannot be achieved with traditional links. For example, DoubleTalk Carrier-in-Carrier when used with 16-QAM approaches the bandwidth efficiency of 256-QAM (8 bps/Hz).

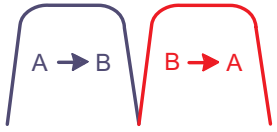
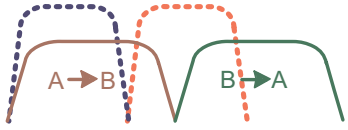
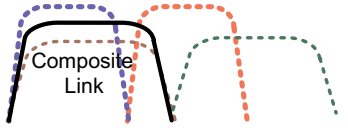
As DoubleTalk Carrier-in-Carrier allows equivalent spectral efficiency using a lower order modulation and/or FEC code, it can simultaneously reduce CAPEX by allowing a smaller BUC/HPA and/or antenna.

DoubleTalk Carrier-in-Carrier can be used to save transponder bandwidth and/or transponder power, thereby allowing successful deployment in *bandwidth-limited* as well as *power-limited* scenarios.



## The Savings Illustrated

The following example illustrates the typical process for implementing DoubleTalk Carrier-in-Carrier in a power-limited scenario:

<p>The conventional link is using 8-PSK, TPC 3/4:</p>	
<p>Spread the signal by switching to a lower order modulation and/or FEC code – say QPSK, TPC 7/8. This increases the total transponder bandwidth, while reducing the total transponder power:</p>	
<p>Now, using DoubleTalk Carrier-in-Carrier, the second QPSK, TPC 7/8 carrier can be moved over the first carrier – thereby reducing the total transponder bandwidth and total transponder power when compared to the original side-by-side 8-PSK, TPC 3/4 carriers:</p>	

## Selection of Form Factors

DoubleTalk Carrier-in-Carrier is currently available in three form factors:

- As an option for the CDM-625 Advanced Satellite Modem
- As an option for the CDM-Qx and CDM-QxL Multi-Channel Satellite Modems
- CLO-10 Link Optimizer (modem agnostic)



**CDM-625 Advanced Satellite Modem**



**CDM-Qx and CDM-QxL  
Multi-Channel Satellite Modems**



**CLO-10 Link Optimizer**

## Consider DoubleTalk Carrier-in-Carrier for Your Network

Our revolutionary and award-winning DoubleTalk Carrier-in-Carrier is a proven technology. Globally accepted, DoubleTalk Carrier-in-Carrier is installed by the major operators and service providers, governments and enterprises.

Does DoubleTalk Carrier-in-Carrier make sense for your satellite links? An easy way to analyze the possible benefits is to download our Excel-based Link Optimization Tool. We created this tool to highlight the multi-dimensional optimization that can be achieved with our advanced technologies. Explore the value today and download this free tool via <http://www.comtechefdata.com/toolstco.asp>

