DoubleTalk® Carrier-in-Carrier®

Bandwidth Compression Technology

DoubleTalk Carrier-in-Carrier Overview

DoubleTalk Carrier-in-Carrier, based on patented “Adaptive Cancellation” technology, allows transmit and receive carriers of a duplex link to share the same transponder space. 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.

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.

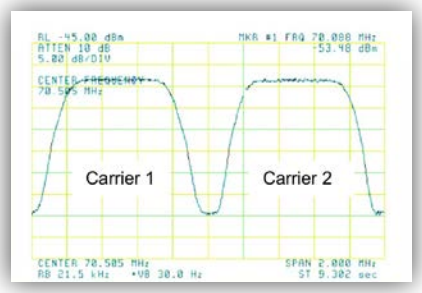

Figure 1:
Without DoubleTalk Carrier-in-Carrier

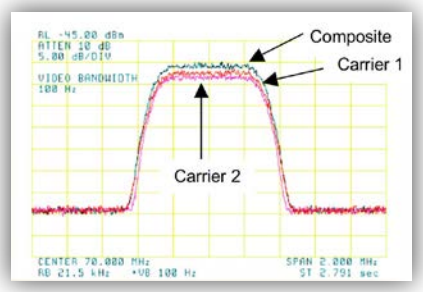

Figure 2:
With DoubleTalk Carrier-in-Carrier

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 (8bps/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.

Global Acceptance of DoubleTalk Carrier-in-Carrier

Our revolutionary DoubleTalk Carrier-in-Carrier is a proven technology. Globally accepted, DoubleTalk Carrier-in-Carrier is installed by major operators, service providers, governments and enterprises. Below are announcements that demonstrate the global acceptance of this award-winning technology.

Date	News Release
September 10, 2013	Comtech Telecommunications Corp. Awarded $1.3 Million in SATCOM Equipment Orders to Support Mobile Network Upgrade and Expansion in Southeast Asia
August 7, 2013	Comtech Telecommunications Corp. Awarded $1.7 Million in Equipment Orders to Support 3G/HSPA Broadband Services in Latin America
April 16, 2013	Comtech Telecommunications Corp. Awarded $1.1 Million Equipment Order to Support Satellite-Based High-Speed Data Trunking
March 13, 2013	SpeedCast Partners with SuperNet and Comtech to Deliver Cellular Backhaul in Pakistan
February 27, 2013	Comtech Telecommunications Corp. Receives $1.2 Million Equipment Order to Support Satellite Mobile Backhaul in Rural Latin America
February 11, 2013	Comtech Telecommunications Corp. Awarded $6.5 Million Buying Agreement from Harris Corporation to Support FAA Network Upgrade
December 18, 2012	Airtel and Comtech EF Data Win Award For Best Backhaul Solution in Africa
August 16, 2012	Comtech Telecommunications Corp. Awarded $1.5 Million Order for DoubleTalk® Carrier-in-Carrier® to Support Service Expansion in Asia-Pacific
July 12, 2012	Comtech Telecommunications Corp. Receives $1.7 Million Equipment Order from Mobile Operator in Asia
June 28, 2012	Comtech Telecommunications Corp. Receives $1.3 Million Modem & Frequency Converter Contract Award to Support Network Expansion in Asia
June 20, 2012	SpeedCast Partners With Comtech EF Data to Deliver Cellular Backhaul Services in Indonesia
May 23, 2012	Comtech EF Data Demonstrates Modem Market Leadership with New Enhancements
May 9, 2012	Comtech Telecommunications Corp. Awarded $2.5 Million SATCOM Equipment Contract to Support Mobile Backhaul & Trunking
May 7, 2012	Comtech Telecommunications Corp. Receives $1.8 Million Order for Modems with DoubleTalk® Carrier-in-Carrier® to Support Military Network Expansion
January 12, 2012	Comtech Telecommunications Corp. Receives $1.0 Million Order for SATCOM Equipment to Support Mobile Backhaul
December 20, 2011	Comtech Telecommunications Corp. Awarded $4.1 Million Contract for SATCOM Equipment to Support Mobile Backhaul
August 24, 2011	Comtech Telecommunications Corp. Receives $1.3 Million Order for Satellite Earth Station Equipment to Support Network Expansion in Asia

August 24, 2011	Comtech Telecommunications Corp. Awarded $1.2 Million Order for Satellite Earth Station Equipment to Support Telecommunications Network Expansion in Africa
August 18, 2011	Comtech Telecommunications Corp. Receives $4.8 Million of Satellite Earth Station Orders From Commercial Customer
June 27, 2011	Comtech Telecommunications Corp. Receives Large Contract From Bharti Airtel for Satellite Cellular Backhaul Equipment
May 10, 2011	Comtech EF Data Receives 2011 NGN Leadership Award from NGN Magazine
April 14, 2011	Comtech Telecommunications Corp. Receives $1.2 Million Satellite Ground Station Equipment Order
March 3, 2011	WTA Announced Finalists for 2011 Teleport Awards for Excellence
December 14, 2010	Comtech Telecommunications Corp. Wins $1.3 Million Order for MIL-STD-188-165A Modems
October 27, 2010	Comtech EF Data Receives New Product Innovation of the Year Award by Frost & Sullivan
July 27, 2010	Comtech Telecommunications Corp. Announces $1.0 Million in Orders for New High-Speed Trunking Modem
July 3, 2010	Receipt of BSNL's Technical Specification Evaluation Certificate for the CDM-625 with DoubleTalk Carrier-in-Carrier
May 3, 2010	Comtech Telecommunications Corp. Awarded $4.8 Million SATCOM Equipment Order From Telecommunications Service Provider
April 5, 2010	Comtech Telecommunications Corp. Wins $12.1 Million in SATCOM Equipment Orders for Government Network Expansion
March 23, 2010	Comtech EF Data's CDM-625 Advanced Satellite Modem Wins Teleport Technology of the Year Award
January 14, 2010	Comtech Telecommunications Corp. Awarded $1.6 Million Order for Satellite Modems for an Asia-Pacific Cellular Operator
January 6, 2010	Comtech Telecommunications Corp. Receives a $1.3 Million Satellite Modem Order
November 19, 2009	Comtech Telecommunications Corp. Wins Advanced Satellite Modem Order for Asian Cellular Operator
November 10, 2009	Comtech Telecommunications Corp. Receives $1.2 Million Order for Satellite Modems to Support Cellular Backhaul in Africa
October 1, 2009	Comtech Telecommunications Corp. Receives $1.1 Million SATCOM Equipment Order from the U.S. Government
April 7, 2009	Comtech Telecommunications Corp. Obtains $2.2 Million Equipment Order to Support Satcom-Based Cellular Backhaul
March 5, 2009	Comtech Telecommunications Corp. Wins $1.7 Million in Equipment Orders to Support Satellite-Based Cellular Backhaul
January 7, 2009	Comtech Telecommunications Corp. Receives $1.4 Million in Equipment Orders to Upgrade a GSM Network in Africa
October 28, 2008	Comtech Telecommunications Corp. Receives $6.2 Million SatCom Equipment Orders to Support Cellular Backhaul in Asia and Middle East
October 14, 2008	Comtech Telecommunications Corp. Wins $1.1 Million Equipment Order to Support Satellite-Based Cellular Backhaul
April 24, 2008	Comtech Telecommunications Corp. Receives $1.1 Million Satellite Communications Equipment Order to Support a Cellular Backhaul Network in Asia
April 21, 2008	Comtech Telecommunications Corp. Receives $1.3 Million Satellite Communications Equipment Order to Support Cellular Backhaul Networks in Africa and the Middle East
March 13, 2008	Comtech Telecommunications Corp. Receives $1.3 Million in Satellite Communications Equipment Orders for GSM Backhaul Network in Africa

February 21, 2008	Comtech EF Data and Intelsat Offer Ways to Increase Satellite Efficiency
October 11, 2007	Comtech Telecommunications Corp. Receives $2.6 Million in Orders to Supply Satcom Equipment for a Cellular Backhaul Network Expansion in Asia
October 2007	ST Teleport Validates the Technical & Business Case for Deploying the Bandwidth-Efficient CDM-Qx with DoubleTalk Carrier-in-Carrier
May 22, 2007	Gateway Communications' Use of the CDM-Qx with DoubleTalk Carrier-in-Carrier
May 2007	Pan-Africa Service Provider Addresses Satellite Capacity Shortage
February 28, 2007	Comtech EF Data Awarded Teleport Technology of the Year by World Teleport Association
November 2006	Premier Communications Provider Doubles Satellite Transponder Throughput

Selection of Products

DoubleTalk Carrier-in-Carrier is currently available as an option for the following products:

- CDM-760 Advanced High-Speed Trunking Modem
- CDM-750 Advanced High-Speed Trunking Modem
- SLM-5650A Satellite Modem
- DMD2050E Universal Satellite Modem
- DMD2050 Universal Satellite Modem
- CDM-625A & CDM-625A-EN Advanced Satellite Modems
- CDM-625 & CDM-625-EN Advanced Satellite Modems
- CDM-Qx & CDM-QxL Multi-Channel Satellite Modems
- DMD20 Universal Satellite Modem
- DMD20 LBST L-Band Satellite Modem
- DMD50 Universal Satellite Modem
- CLO-10 Link Optimizer (modem agnostic)

View the individual product datasheets for complete specifications.

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