

Application

The Intelligent Channel Optimizer (ICO) is a GUI-based tool used to maximize the throughput of RF upstream channels connected to Cadant® C4® CMTS DOCSIS® 2.0 Cable Access Modules (CAMs). After analyzing the noise conditions for a particular upstream channel, the ICO employs error analysis algorithms to provide guidance on optimal modulation profile and upstream channel settings. The operator may then choose to use the ICO to apply the recommended profile and channel settings to the selected upstream. The ICO runs on a laptop or PC and may be used remotely via Telnet, Secure Shell version 2 and SNMP.

Maximizing Upstream Throughput

With the wide array of parameters that must be specified for modulation profiles and upstream channels, operators may be uncertain as to whether the parameters they have selected are maximizing upstream throughput. By looking at the actual noise conditions and employing sophisticated algorithms, ICO takes the guesswork out of selecting the best set of parameters to obtain a higher subscriber bit rate in the upstream at an acceptably low packet error rate.

Optimal Modulation Profile and Upstream Channel Parameters

Utilizing Fast Fourier Transform (FFT) data from the RF burst receiver, the spectrum from a specific C4 CMTS upstream is displayed (Power Density vs. Frequency). ICO can then measure the noise level in the upstream channel.

Using the upstream noise spectrum data, the ICO calculates the effective Signal-to-Noise Ratio (SNR) and Packet Error Rate (PER) for a wide range of possible modulation profiles and upstream channel parameters.

Based on the calculation results, the ICO provides guidance on optimal modulation profile and upstream channel parameter settings. The operator can then use the ICO to apply the optimal settings to the particular CMTS upstream.

Optimization Within Operator Specified Restrictions and Limitations

As an option, the operator may use the ICO to recommend a new, optimized modulation profile without changing basic parameters such as center frequency, channel width or channel type (TDMA, ATDMA, TDMA-ATDMA or SCDMA). The operator can also specify limits for parameters like center frequency and cable modem power level range, and ICO will run the optimization algorithm within the specified limits.

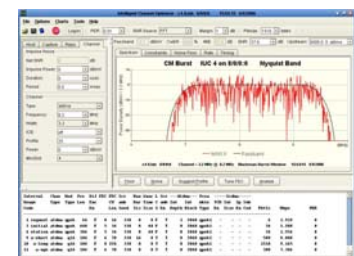
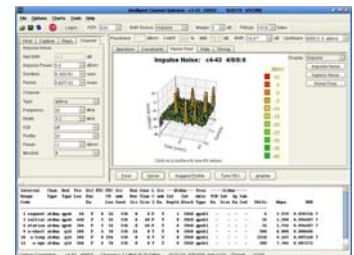
Optimization That Accounts for Changing Noise Conditions

The ICO can be run in an iterative mode in which noise samples are taken at operator-specified time intervals. These noise samples can then be averaged to take into account changing noise conditions and the averaged result is used for the optimization calculation. Alternatively, the worst of the noise samples may be used for the optimization calculation for even more robust performance in meeting levels of service committed to subscribers.

Performance Metric Calculations

Using a given modulation profile and the upstream channel noise spectrum data, the ICO calculates important performance metrics such as available user bandwidth and expected packet error rate. Alternatively, the upstream channel noise level can be specified by the user.

- **ICO Runs On Laptop Or Desktop PCs**
- **Optimize Modulation Profiles & Upstream Channel Parameters For Maximum Throughput**
- **May Be Used Remotely Via Telnet, Secure Shell v. 2 and SNMP**
- **Works With Cadant® C4® CMTS Release 5.0 Software**
- **The ICO Calculation Is Done For A Wide Range Of:**
 - **Modulation Profile Types**
 - **Channel Widths**
 - **Center Frequencies**
 - **Forward Error Correction (FEC) Values**





Specifications

Required Hardware Platform	Laptop/PC equipped with Pentium III @500Mhz, 512 MB RAM 512 MB Hard-Disk for installation 1024 x 768 True-color 10baseT Ethernet Card
Required Operating System	Operating System Windows 2000 (SP4), Windows XP or Windows NT 4.0 (SP6a)
Required CMTS Hardware	Fully functional Cadant C4 CMTS with DOCSIS 2.0 CAMS (2Dx12U). Note: the ICO is not functional with 1Dx8U CAMs.
Required CMTS Software	Cadant C4 CMTS Release 5.0 and higher
ICO Operation Modes	Major Operation Modes FFT Capture Modeuses time domain sampling of the specified upstream spectrum Optimizer Mode uses the FFT capture data to provide guidance on parameter optimization Theory Mode explores how changes in various channel characteristics and burst profile parameters might affect performance Minor Operation Modes Iterative Modeschedules FFT data captures to be taken at specified intervals over a specified time period Averaging Modeuses FFT data averaged over a specified time period to run the Optimizer Mode functions Worst-case Mode takes samples at specified time intervals for a specified period; uses worst-case FFT data to run the Optimizer Mode functions
ICO Charts and Graphs	Power density versus frequency Packet error rate versus Signal-to-Noise Ratio (SNR) Achievable bit rate versus SNR Bit rate, packet rate or packet error rate versus packet size

**Intelligent Channel Optimizer (ICO)
Ordering Codes & Descriptions**

#719383 ICO Release 1.0 CD-ROM
 #719384 ICO per downstream license fee

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