Product Bulletin
June 27, 2013

Advanced VSAT Solutions
Firmware Release 1.5.1

Comtech EF Data is pleased to announce the availability of the Advanced VSAT Solutions firmware release 1.5.1. The new firmware adds significant new features to the Advanced VSAT Solutions portfolio and enhances a number of existing features.

Release 1.5.1 is available for:

- CTOG-250 Traffic Optimization Gateway
- CDM-800 Gateway Router
- CDD-880 Multi-Receiver Router
- CDM-840 and ODM-840 Remote Routers

Release 1.5.1 fully integrates Advanced VSAT with the Vipersat Management System (VMS) version 3.11 for Dynamic SCPC (dSCPC) and ROSS for global roaming.

Key Features & Enhancements

Release 1.5.1 includes:

- Bridge Point-to-Multipoint (BPM) Mode
  - VLAN Trunking
  - VLAN Access Mode for CDM-840
  - Jumbo Frame support
  - VMS integration for Dynamic SCPC
- Jumbo Frame Support for Router Mode
- Global roaming with external ROSS
- Low overhead graphical user interface for CDM-840
- Enhanced outbound statistics
- ECMv2 performance enhancements
- AES-128 encryption
- DNS caching for CDM-840
- CTOG-250 route table increased to 2048 routes
- Changes to redundancy

Bridge Point-to-Multipoint (BPM)

The BPM capability enables layer 2 operation so that an Advanced VSAT network can operate as an Ethernet switch in the sky (“Sky Ethernet Switch”) with MAC learning, VLAN trunking and VLAN access mode while benefitting from:

- Multi-level QoS
- Header and payload compression
- Bi-directional Adaptive Coding & Modulation (ACM)
- Dynamic SCPC bandwidth on demand.

Ethernet frames containing higher layer protocols including VLAN, MPLS, IPv4/IPv6, UDP, TCP, RTP, OSPF and BGP, will seamlessly flow through Advanced VSAT networks just like any Ethernet switch, greatly simplifying the network design, deployment and operation.

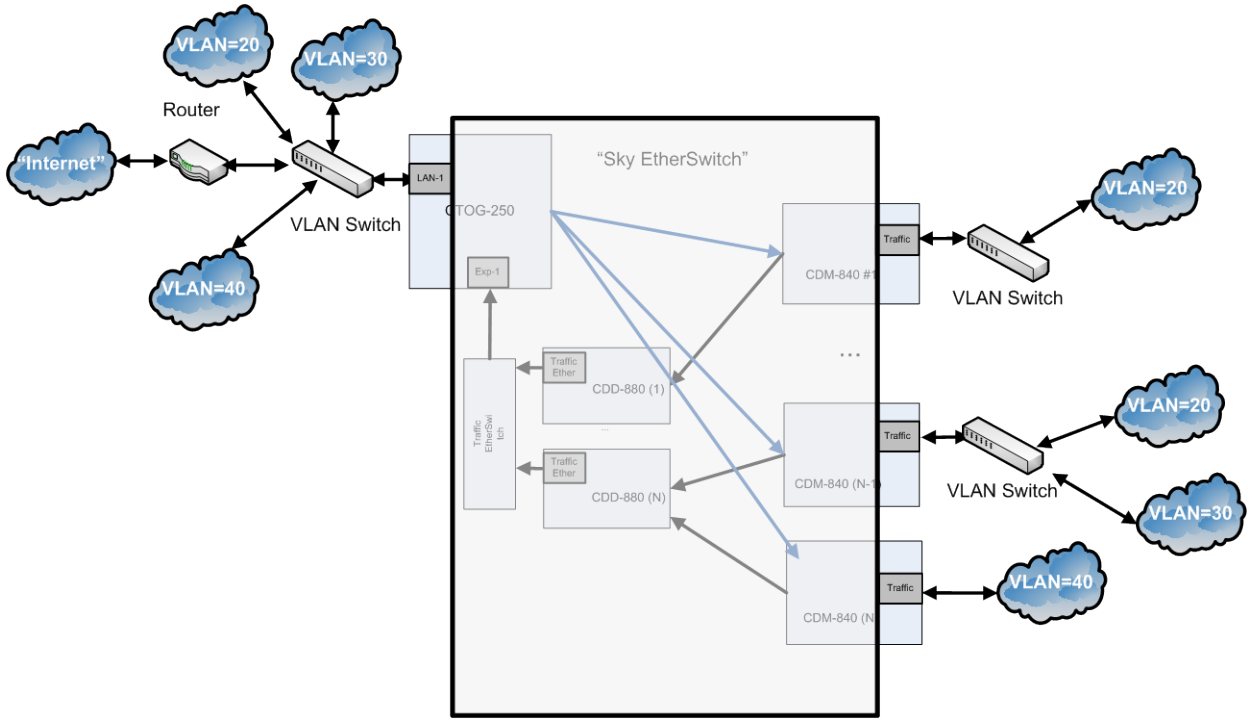


Figure 1. Advanced VSAT Network with VLAN

The Advanced VSAT hub equipment always functions in VLAN Trunking Mode. VLAN tagged Ethernet frames received by the CTOG-250 LAN-1 interface will be passed to the appropriate remote modem unchanged. Likewise, when the CDM-840 is in Trunking Mode, VLAN tagged Ethernet frames tags will be passed through the modem unchanged and unfiltered.

As part of 802.1Q support, the CDM-840 supports configuring the traffic port in either Trunk or Access Mode. In Access Mode, the CDM-840 operates as follows:

- All frames received on the traffic Ethernet port and destined to WAN are VLAN tagged with the configured Access Port VLAN ID prior to transmission to hub
- All frames received from the WAN with the matching VLAN ID will have the VLAN tag removed and the packet will be transmitted over the traffic Ethernet port
- Any frames received from the WAN that do not have a matching VLAN ID will be dropped

BPM mode is fully integrated with Vipersat Management System for Dynamic SCPC (dSCPC).

In BPM Mode, VLAN ID can be used to define Group membership in addition to IP subnet.

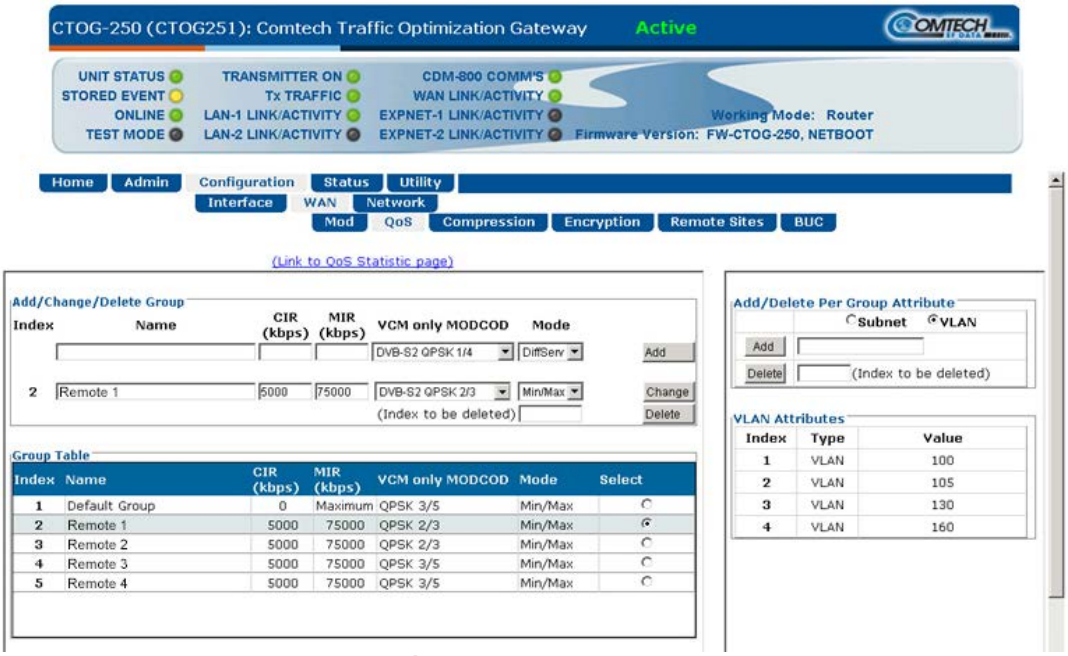


Figure 2. Group QoS

In addition to lossless payload compression, BPM also supports Layer 2, Layer 3 and Layer 4 header compression. Header compression provides significant bandwidth savings for traffic such as VoIP by reducing the L2/L3/L4 header to an average of 2-3 bytes. Supported headers include:

- Ethernet 2.0
- Ethernet 2.0 + VLAN-tag + VLAN-tag
- 802.3-raw
- 802.3-raw + VLAN-tag + VLAN-tag
- 802.3 +802.2 +VLAN-tag
- 802.3 +802.2 + SNAP
- 802.3 +802.2 + SNAP + VLAN-tag + VLAN-tag
- IP
- IP/UDP
- Ethernet 2.0 + VLAN-tag
- Ethernet 2.0 + MPLS
- 802.3-raw + VLAN-tag
- 802.3 +802.2
- 802.3 +802.2 +VLAN-tag +VLAN-tag
- 802.3 +802.2 + SNAP + VLAN-tag
- 802.3 +802.2 + SNAP + MPLS
- IP/TCP
- IP/UDP/RTP

With ever-increasing transmission speeds and usage of VLANs and MPLS, the need for larger and larger Ethernet frames for improved efficiency continues to grow. Lack of jumbo Ethernet frame support leads to fragmentation and increased overhead. Advanced VSAT BPM mode supports jumbo Ethernet frames up to 2018 bytes.

BPM is not supported for ODM-840 in 1.5.1.

Global Remote Roaming

Advanced VSAT supports global roaming in conjunction with the Vipersat Management System and Roaming Oceanic Satellite Server (ROSS). This allows a remote satellite terminal on-board an oceanic vessel to seamlessly transition between satellite beams or hub coverage with minimal service interruption.

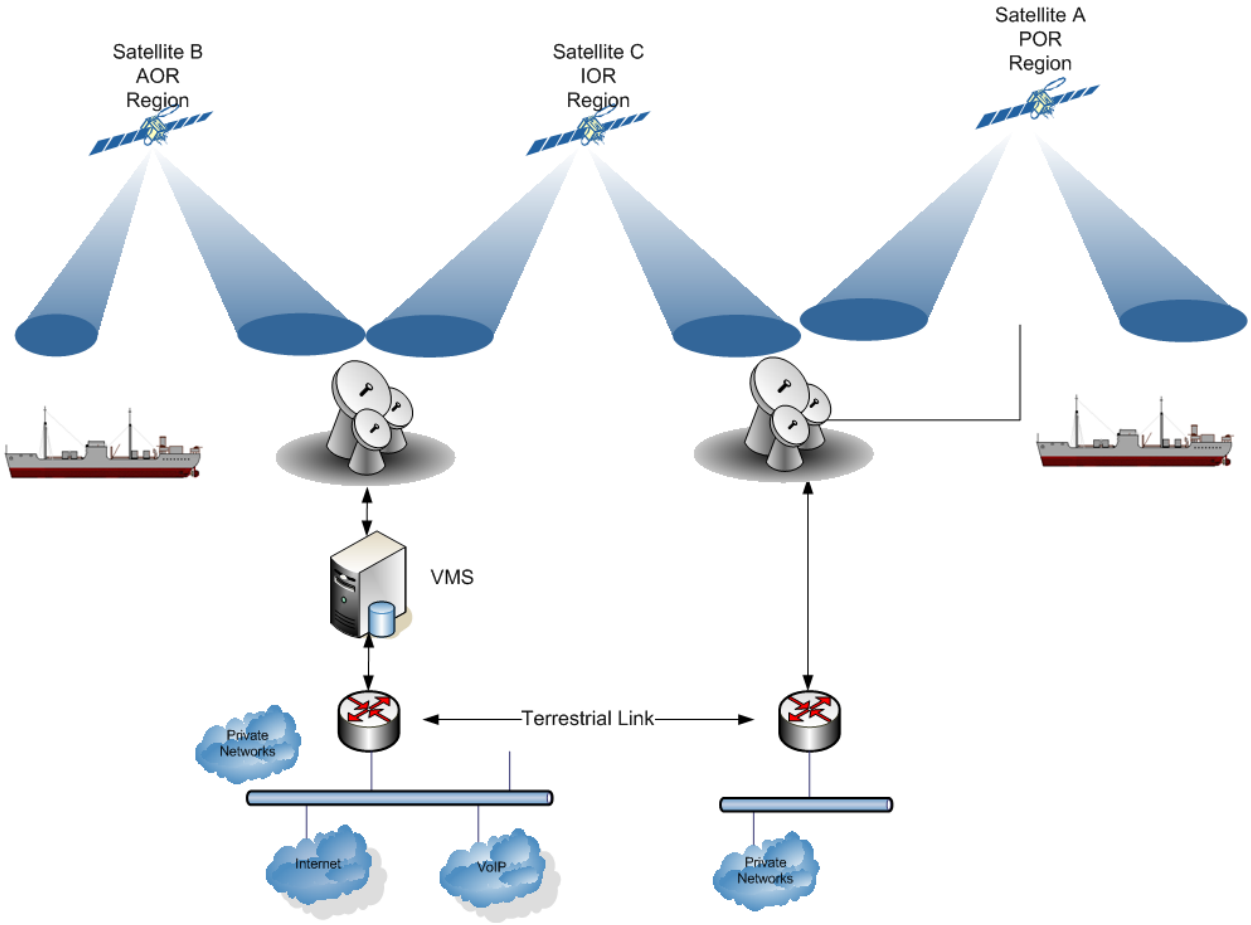


Figure 3. Global Roaming

The ROSS serves as the onboard satellite mobility controller. In conjunction with the Antenna Control Unit (ACU), the ROSS performs satellite antenna re-pointing and information gathering. When a handover is required, the ROSS will push new pointing information to the ACU and provide the new transmission parameters to the CDM-840 for service area handoff between satellite coverage areas.

Figure 4. Roaming Oceanic Satellite Server (ROSS)

The ROSS operates as a mediation device between the CDM-840 and the Antenna Control Units subsystem. ROSS communicates with the CDM-840 Remote Router and the ACU over Ethernet LAN interface using the proprietary and open ROSS Open Antenna Management (ROAM) protocols. It polls the Global Positioning Satellite (GPS) coordinates from the ACU, determines the current location and executes the appropriate commands and uploads configuration files to update communication parameters.

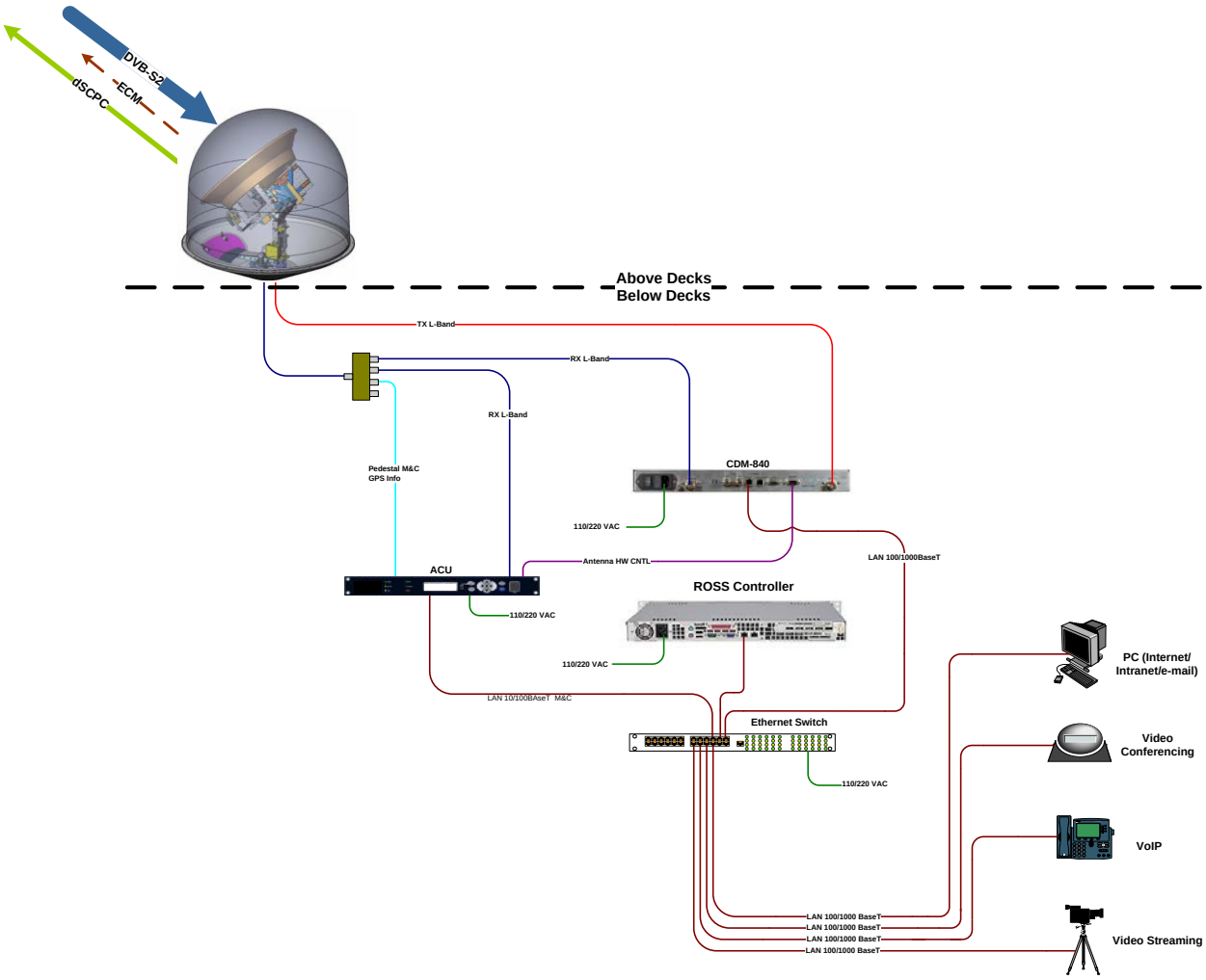


Figure 5. Terminal Configuration

The ROAM protocol has been adopted and implemented by major industry leaders in maritime stabilized antenna systems including SeaTel/Cobham, Orbit Marine, Intellian, KNS, Thrane & Thrane, Mitsubishi and others.

ROSS supports many advanced capabilities including:

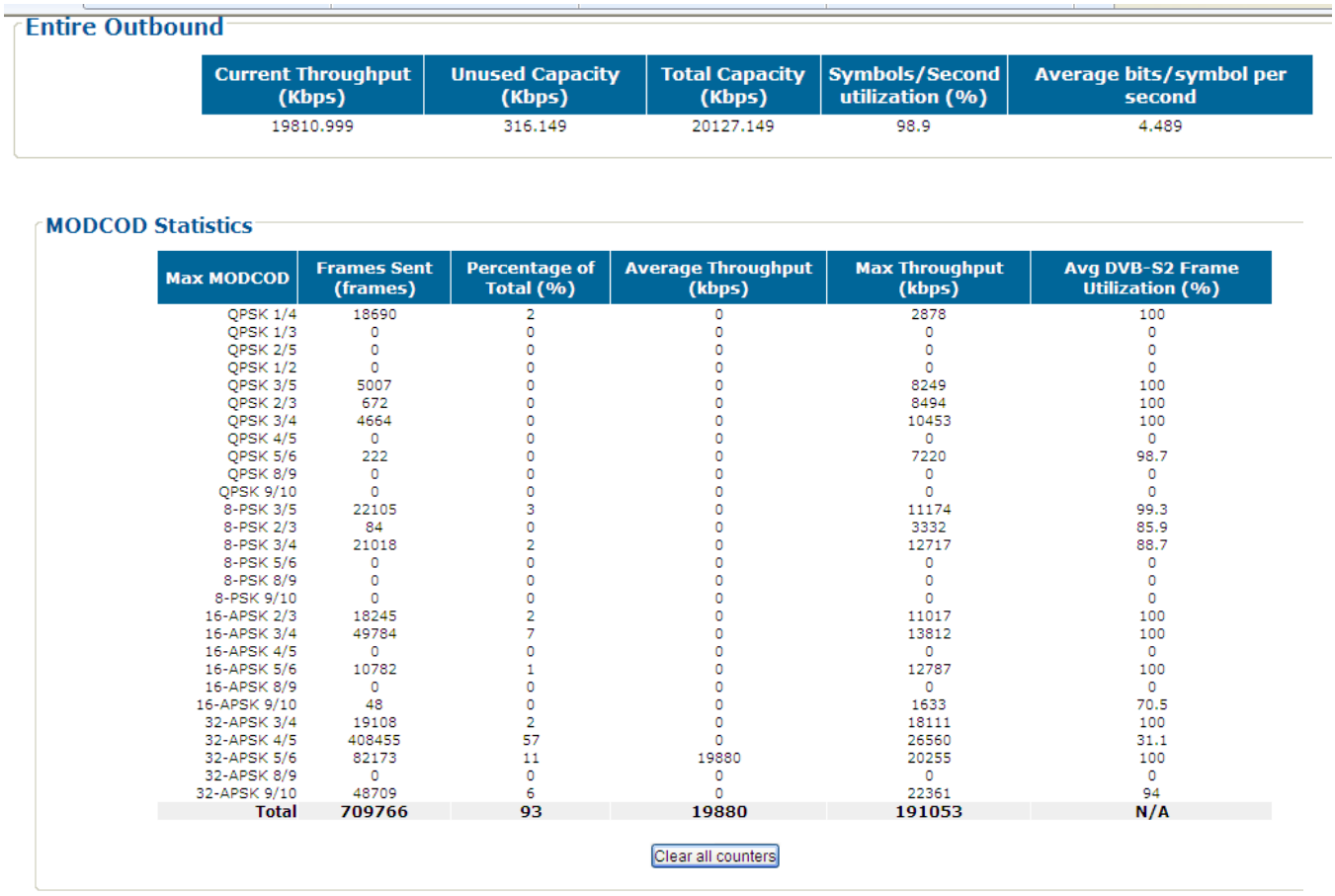
- Beam Priority - best selection of overlapping beams.
- Automatic Backup Beam – in case of antenna blockage or limit stops the system will try an alternate beam.
- World Shoreline Mapping, automatically control transmission frequency band exclusion zones.
- Multiple Frequency Band, X-Band, C-Band, Ku-Band & Ka-Band.
- Automatic Antenna Feed & Band Select supports different satellite configurations.
- One Single Load File, stores all variations of service area configurations providing global distribution to all vessels regardless of operational beam coverage, frequency bands or on-board hardware.

Enhanced Outbound Statistics

Outbound statistics has been enhanced to include outbound capacity, utilization and spectral efficiency. The new statistics for the outbound include:

Statistic	*Description*
Current Throughput (kbps)	Throughput (i.e. used capacity) during last second
Unused Capacity (kbps)	Outbound capacity that was available but not used during last second, which is calculated by multiplying the unused symbols and the average symbol utilization during last second
Total Capacity (kbps)	This is the sum of throughput and unused capacity during last second
Symbols/Second utilization (%)	Percentage of symbols utilized for traffic during last second
Average bits/symbol per second	This provides the average spectral efficiency for user traffic during last second

The statistics are updated every second.



Entire Outbound

Current Throughput (Kbps)	Unused Capacity (Kbps)	Total Capacity (Kbps)	Symbols/Second utilization (%)	Average bits/symbol per second
19810.999	316.149	20127.149	98.9	4.489

MODCOD Statistics

Max MODCOD	Frames Sent (frames)	Percentage of Total (%)	Average Throughput (kbps)	Max Throughput (kbps)	Avg DVB-S2 Frame Utilization (%)
QPSK 1/4	18690	2	0	2878	100
QPSK 1/3	0	0	0	0	0
QPSK 2/5	0	0	0	0	0
QPSK 1/2	0	0	0	0	0
QPSK 3/5	5007	0	0	8249	100
QPSK 2/3	672	0	0	8494	100
QPSK 3/4	4664	0	0	10453	100
QPSK 4/5	0	0	0	0	0
QPSK 5/6	222	0	0	7220	98.7
QPSK 8/9	0	0	0	0	0
QPSK 9/10	0	0	0	0	0
8-PSK 3/5	22105	3	0	11174	99.3
8-PSK 2/3	84	0	0	3332	85.9
8-PSK 3/4	21018	2	0	12717	88.7
8-PSK 5/6	0	0	0	0	0
8-PSK 8/9	0	0	0	0	0
8-PSK 9/10	0	0	0	0	0
16-APSK 2/3	18245	2	0	11017	100
16-APSK 3/4	49784	7	0	13812	100
16-APSK 4/5	0	0	0	0	0
16-APSK 5/6	10782	1	0	12787	100
16-APSK 8/9	0	0	0	0	0
16-APSK 9/10	48	0	0	1633	70.5
32-APSK 3/4	19108	2	0	18111	100
32-APSK 4/5	408455	57	0	26560	31.1
32-APSK 5/6	82173	11	19880	20255	100
32-APSK 8/9	0	0	0	0	0
32-APSK 9/10	48709	6	0	22361	94
Total	**709766**	**93**	**19880**	**191053**	**N/A**

Clear all counters

Figure 6. Enhanced Outbound Stats

Low Overhead CDM-840 Graphical User Interface

CDM-840 now offers a low overhead graphical user interface (GUI) for managing CDM-840 over the satellite link. The low overhead GUI uses a text based Virtual Front Panel (VFP) in place of the high resolution graphical VFP, speeding up the response time and reducing the bandwidth required over the satellite link. Users can seamlessly switch between the enhanced mode and the low overhead mode.

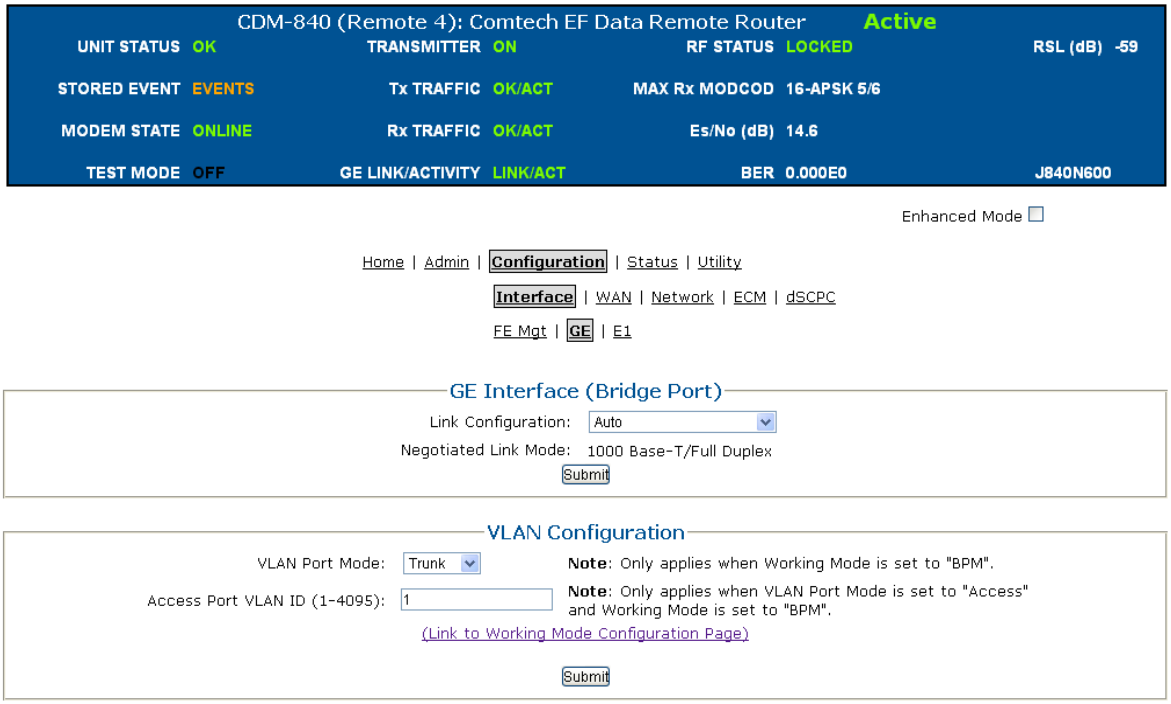


Figure 7. CDM-840 Low Overhead GUI

DNS Caching

DNS caching speeds up Internet access by eliminating subsequent queries over the satellite link:

- When CDM-840 receives a DNS query, a DNS cache look up is performed in the local DNS cache. If the entry is found, DNS response message is returned to the requesting entity with a time-to-live value of 10 seconds. If no match is found, the request packet is forwarded to the Hub.
- When a DNS response packet is received from Hub a check is made to see if the entry already exists in the cache. If it exists, the time-to-live for the entry is reset to 900 seconds (15 minutes). If it's a new entry it is added to the cache with time-to-live set to 900 seconds (15 minutes).
- The local DNS cache is periodically cleaned by removing expired entries.

Entry Channel Mode v2 (ECMv2) Performance Enhancements

ECMv2 has been enhanced to speed up remote entry into the network after a revert.

CDM-840 1:1 Redundancy Changes

The online management IP address of the CDM-840 Remote Router when operating in 1:1 redundancy with the CRS-170A now refers to the online unit. If there is a switchover, the newly online unit assumes the online management IP address. This allows 1:1 hardware redundancy in a VMS managed network.

CTOG-250 Route Table Size

CTOG-250 route table now supports 2048 routes when operating in router mode.

AES-128 Encryption

The Advanced VSAT supports AES-128 encryption for the shared outbound and the VersaFEC return channel.

Visit our web site www.comtechefdata.com for more information on the Advanced VSAT Solutions. To upgrade your existing network, please contact Comtech EF Data customer support or your sales associate. To place your order, please contact your Comtech EF Data sales associate.

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