

**ECLIPSE** OSR FEATURES



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AAE Systems, Inc. is pleased to introduce the next level in our Eclipse Multi-Frequency Time Division Demand-Assigned Multiple Access (MF-TDMA DAMA) satellite communication system products. AAE's Eclipse Digital Satellite Router (DSR) equipment family introduces a quantum leap in network size, capacity, and feature enhancements, including the latest in Turbo Product Code, TCP enhancement protocols, advanced routing, and security capabilities. The DSR equipment family includes associated core building blocks for a cost-effective, dynamic satellite communications infrastructure. The DSR equipment family serves networks of various size and topologies through the following satellite router models.

**Eclipse Models and Functions:**

**DSR 12**

**Remote Terminal Router**

A single rack unit (RU) package supporting up to 12 Mbps bi-directional MF-TDMA DAMA data rate, with an additional 72/80 Mbps DVB-S/S2 receive capability.

**DSR 12m**

**Small Network Moderator Router**

Same as the DSR-12 remote with an optional external 10 MHz stabilized reference for master network timing.

**DSR 12GPS**

**Remote Terminal Router**

Remote Terminal Router – Updates network Moderator and NMS with terminal location information in flyaway, shipboard, and mobile terminals.

**DSR 48**

**Network Moderator Router**

A single rack unit (RU) package providing up to 48 Mbps of MF-TDMA DAMA bandwidth with the option for an additional DVB-S/S2 uplink capability of up to 80 Mbps. A single DSR-48 Moderator router may also support multiple networks across separate transponders.

**NETWORK CAPACITY**

The Eclipse DSR family supports up to 12 Mbps of MF-TDMA DAMA data rate, with an additional 72/80 Mbps DVB-S/S2 downlink capacity per DSR-12 remote site node. The Eclipse DSR-48 Hub station Moderator is designed to support up to 48 Mbps of MF-TDMA DAMA uplink and downlink capacity in a single network or multiple networks. The DSR-48 Hub station Moderator with DVB option supports an additional uplink broadcast carrier of up to 80 Mbps DVB-S/S2 in addition to the MF-TDMA capacity.

**ADVANCED FEATURE ENHANCEMENTS**

The Eclipse DSR incorporates enhanced features designed to support larger networks with the latest in expanded multimedia service requirements.

- Turbo Product Code – AAE has incorporated Turbo Product Code (TPC) with the Eclipse bandwidth efficient CPFSK modulation format. The CPFSK format already requires less bandwidth per carrier than traditional QPSK modulation schemes and the addition of TPC combines bandwidth savings performance with a significantly lower Eb/No; thus, supporting larger carriers with smaller and less costly antenna and RF packages.
- Packaging Flexibility – DSR models are packaged in a 1RU rack mount chassis, supporting a user data rate of up to 12 Mbps with a single DSR-12 and 48 Mbps with a single DSR-48.
- Built-in TCP acceleration and header compression
- On board DVB-S/S2 with data throughput up to 80 Mbps per DSR-12 (downlink) and DSR-48 (uplink)
- Embedded Linux operating system
- Over-the-air software updates
- Extensive health and utilization monitoring system through Eclipse NMS
- 110-220 VAC or 24VDC
- Unicast, Multicast (PIM-SM), and Broadcast supported
- Embedded 3DES or 256-bit AES encryption
- Expanded network node capacity up to 1,200 nodes in a single subnet and up to 4,800 nodes per a single DSR-48
- Built-in spectrum analysis toolset to perform on site satellite identification and antenna alignment
- All major routing protocols supported (including MPLS)
- GPS interface (option)
- Solar power (option)

**FLEXIBLE TOPOLOGY**

Eclipse MF-TDMA DAMA technology is further enhanced with an on board DVB-S/S2 – IP receiving feature greatly expanding the flexibility and capacity of network applications. The supported topologies include the following.

- True Mesh – A single DSR-12 at each site provides direct, single hop satellite communication to the other sites in the network, supporting complete communications services (voice, data, video, etc.) to multiple sites simultaneously. Mesh networks of up to 1,200 nodes are supported. A single DSR-48 can support up to 4 x 1,200 node Mesh networks.
- Star – Communication is routed between the remotes and the Hub only without direct remote-to-remote communication. Single Moderator subnet groupings of up to 1,200 nodes may be supported using a single DSR-12 Moderator and up to 4,800 nodes by a single DSR-48 Moderator. Multiple subnets may span multiple transponders and satellites from a single Hub.
- Star/Mesh-DVB Hybrid – Incorporating a DVB-S/S2 modulated IP encapsulated carrier with the MF-TDMA carrier system expands the network capacity and flexibility for both Mesh and Star DAMA networks. The dual capability modulator supports DVB-S data rates from 1 to 70 Mbps or DVB-S2 data rates from 18 to 80 Mbps in combination with the 48 Mbps MF-TDMA of the DSR-48 Moderator. The DVB-S/S2 decoder embedded in the DSR-12 remote router supplements the 12 Mbps of inbound and outbound MF-TDMA DAMA capacity.



The Eclipse's advanced technology and aggressive pricing policy make it extremely viable in virtually any network application involving satellite communication. For more information on how the Eclipse works and where it can be used please visit <http://www.aaesys.com/>.

#### FREQUENCY AGILE MF-TDMA DAMA

The Eclipse MF-TDMA DAMA architecture with burst-by-burst frequency agility offers numerous advantages in terms of bandwidth efficiency, expandability, and throughput. In multi-frequency networks, the carriers are managed as a collective pool of bandwidth with terminals assigned timeslots on whichever frequency has bandwidth available at the time. Network expansion is simplified through the addition of carriers (up to ninety (90) supported) and remote stations as required. All nodes are automatically updated by the Moderator without service interruption.

#### BANDWIDTH-ON-DEMAND DAMA

The Eclipse products continuously allocate and reallocate bandwidth to terminals on a burst-by-burst basis. The intelligent bandwidth allocation algorithm bases the timeslot commitment on the size of the packets in each request. The allocated timeslots are dependent on CIR, BLR, and packet size. The Committed Information Rate (CIR) and the Burst Limit Rate (BLR) settings for each node achieve the maximum possible throughput without wasting bandwidth. The Eclipse MF-TDMA DAMA bandwidth management is optimized to work in a multi-frequency TDMA environment getting the most out of the least amount of satellite bandwidth with the fastest burst rate available.

#### QUALITY-OF-SERVICE

Besides the CIR and BLR, the Eclipse network supports prioritized treatment of time sensitive IP-based communication through multi-level QoS and precedence features. The Priority Queuing algorithm sends premium data streams to the satellite channel ahead of non-priority data. The Best Effort priority allocation is afforded to the data that is not time-sensitive. When all available bandwidth is assigned, as in a fully loaded network, forced de-allocations of lower priority data will give premium channels their guaranteed bandwidth. Up to sixty-four (64) different service classes are supported through the Eclipse traffic shaping tools.

#### AUTOMATIC ADAPTIVE RAIN FADE AND POWER CONTROL

Automatic control of transmission power and modulation are used on a node-by-node basis to counteract changes in atmospheric conditions (rains, heavy clouds, etc.). Reducing the modulation index to achieve the same BER performance at a lower Eb/No compensates for rain fade conditions. Rain fade adjustments are dynamically made on a burst-by-burst basis for only the affected nodes and only for the duration of the degradation. Besides creating increased availability of the satellite channel, the combination of modulation plus power adjustment allows for much smaller rain fade margins to be accounted for in terminal sizing, whereby reducing the terminal costs.

#### 10/100/1000BASE-T ETHERNET INTERFACE

The Eclipse DSRs may be directly connected to the Ethernet LAN, eliminating the need to use bridges, interface converters, or other intermediary devices; thus, increasing the reliability and giving considerable savings in costs. IP packets to and from various destinations travel to networking devices through a single high-speed interface. The DSR automatically routes communications based upon the IP addressing scheme. Multiple separate or private user networks are supported within the same Eclipse satellite network.

#### EMBEDDED LINUX OPERATING SYSTEM AND ENHANCED FEATURE SET

The Eclipse DSR platform uses an Eclipse unique embedded Linux operating system providing numerous routing, security, and update features. The Eclipse DSR family of routers support Unicast, Multicast, as well as Broadcast operations, enhanced encryption to include 3DES and 256-bit AES, over-the-air software update downloads, and all standard routing protocols, including MPLS.

#### BACKWARD COMPATIBILITY

The Eclipse DSR products maintain full backward compatibility with the Eclipse DSM-1 and DMM-6 platforms, permitting expansion and support of currently deployed systems.

#### L-BAND IF INTERFACE

The DSR-48 incorporates lossless IF splitting and combining for the four (4) internal DSR modules, providing a single transmit and receive interconnect point for the L-band IF cabling connection to the outdoor RF equipment. The highly stable internal OCXO 10 MHz reference may be used for the outdoor BUC and LNB via the IF cabling, as required. The DSR-12 supplies the DC and 10 MHz reference signals for the LNB and BUC via the coaxial IF cables.

#### FEATURE RICH NETWORK MANAGEMENT SYSTEM (NMS)

The Eclipse NMS gives the network operator a user friendly, powerful management tool for configuring and monitoring the performance of a single satellite network or multiple networks within the same unit. The NMS is not involved in the actual communication process between the nodes in a network, as it is managed automatically by the network Moderator node; failure of the NMS will not impact normal system operation. The NMS supports multiple client operators, multiple customers, and multiple networks providing individual network managers configuration control and monitoring access to their portion of the network. Different levels of access privileges may be assigned on a per-user basis by the system administrator.

#### MULTI-LEVEL REDUNDANCY

The Eclipse system is designed to meet the stringent reliability and availability criteria of critical networks. The network Moderator is the critical element in the MF-TDMA DAMA network. Eclipse architecture supports multi-level local and geographic Moderator redundancy through the application of primary, secondary, and candidate Moderator assignments. As many as nine (9) candidate Moderators are supported per network with sequential promotion to secondary status on primary failure. Moderator switchover is seamless and does not require physical switching or idle standby equipment. The secondary and candidate Moderators are active communications units. Moderator redundancy is managed automatically without terrestrial connection or NMS intervention.

#### OPEN NETWORK ARCHITECTURE

The Eclipse based systems provide an open network interface architecture to support Internet, Intranet, and Extranet communication. Eclipse networks readily support new IP based applications as they are developed, which may be implemented without changes to the network architecture.

#### INTEGRATION OF OTHER COMMUNICATION APPLICATIONS

AAE has integrated a number of diverse communication platforms and interfaces into Eclipse MF-TDMA DAMA network. In some instances, translation may be required to interface different interface standards. Eclipse networks provide cross network interconnection of serial data, video, GSM/CDMA backhaul, SCADA, various telephony interface standards, as well as HF, UHF/VHF, and LMR auxiliary radio systems among many others. The Eclipse system provides the traffic shaping tools and flexibility to support all forms of communication, from the latest developments in data and video applications to legacy systems. AAE has the network solution for any communication need.

#### FUTURE PROOF

The Eclipse DSR products are designed with the future in mind, supporting over-the-air downloads for feature and function additions, updates, and enhancements.



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