INTUITION

EXPERIENCE
MX-DMA MRC

SEAMLESS DYNAMIC BANDWIDTH ALLOCATION

iDIRECT

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Mx-DMA MRC is a patented multiple-access waveform designed to offer service providers ultimate service agility and a full spectrum of use cases on shared satellite capacity. It is the satellite industry's most dynamic and flexible return technology.

Mx-DMA MRC (Multi-Resolution Coding) allows service providers to share satellite capacity more efficiently over a group of satellite terminals. It incorporates the best features of other return technologies—the scalability of MF-TDMA and the spectral efficiency and performance of SCPC—into a single return technology suited for a wide range of applications.

MX-DMA MRC:
EXPECT A GREATER RETURN

- ✓ Highly efficient, dynamic bandwidth sharing in real-time
- ✓ Manage complex traffic demand effortlessly
- ✓ Scalable hub demodulator technology for thousands of sites
- ✓ Multi-service platform with highest QoE

Service providers can now cover a myriad of use cases in a single return link, from cruise ships and large enterprise customers to SCADA and broadband access. Mx-DMA MRC can easily support bursty traffic and higher contention services while simultaneously supporting high data rate requirements with high availability.

Performance Sets a New Standard

Mx-DMA MRC combines SCPC-like throughputs with already outstanding SCPC-like efficiency and TDMA-like scalability, into a single return. The result is a new benchmark for network performance and enhanced service agility.

Mx-DMA MRC supports high speed returns of up to 300 Mbps with symbol rates up to 100 Msps (when combined with MDM5010) and modulations up to 64APSK for any application. With the extended capability to support up to 5000 terminals per beam or satnet, there is no compromise between scalability, performance, or optimum spectral efficiency. All these terminal types and applications can be served from the same shared capacity for unprecedented service agility.

How It Works

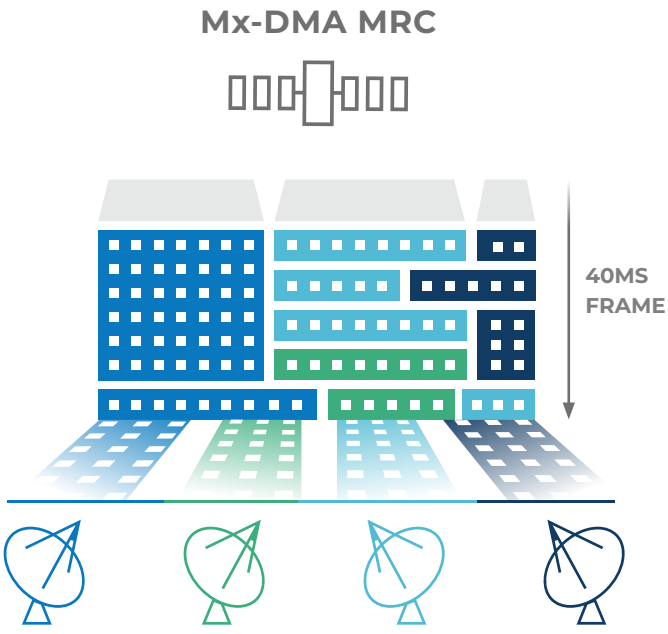
Based on return traffic demand, QoS settings and link conditions, Mx-DMA MRC adjusts the frequency plan, symbol rate, MODCODs, transmission and code lengths, and power in real time for every terminal in the network. All of this happens in a fully self-organizing way. There is no need for pre-defining return carrier plans for a mix of terminal and service types (a common predicament associated with TDMA return technologies) as Mx-DMA MRC orchestrates the allocation of the available capacity automatically. This alleviates the downsides of predefined carrier planning, such as penalties to efficiency because of oversized carriers, lower fill rates and utilization, and congestion.

As a result, Mx-DMA MRC return technology supports a mix of different traffic profiles in shared return capacity. Terminals with a steady traffic demand will operate like a SCPC link, with slowly varying transmission parameters depending on link conditions, but will seamlessly share capacity with highly overbooked terminals carrying bursty traffic. Terminals not passing traffic will log off and restart transmission with an unsolicited logon mechanism when needed. This means that there is no idle capacity consumption.

FASTEST REACTION TIME AND PRECISION ALLOCATION

Mx-DMA MRC waveforms have the fastest reaction time combined with bandwidth allocations that adapt precisely to changing user demand. The rapid response is made possible by precise time and frequency synchronization between the hub and the remotes which occur at 5 ms intervals. Up to 25 transmit plans are being created per second. Each new plan takes a holistic, network-wide view of multiple elements for all sites:

- ***Frequency***
- ***Transmit Power***
- ***Symbol Rate***
- ***MODCODs***
- ***Transmission Length***
- ***Code Length***



Mx-DMA MRC Key Features

- **High Resolution Bandwidth Allocation:** Mx-DMA MRC redistributes the available spectral resources 25 times per second, allowing it to seamlessly adapt to changing traffic demand and link conditions. Minimum transmission lengths of 5ms tied to a symbol rate granularity of 100kHz, ensure industry-leading granularity in bandwidth assignment, lowest latency and jitter, and highest efficiency for any traffic profile.

- **Scalable Demodulator Technology:** Mx-DMA MRC supports minimum transmit lengths of 5ms, allowing up to 5,000 active terminals with a single multi-carrier demodulator, resulting in increased hub density with less hardware needed at the hub side.

- **Adaptive Payload Length:** Mx-DMA MRC adapts the payload length in real time versus using pre-coded static payload length like other technologies, resulting in important efficiency gains across all applications, from low-rate bursty traffic profiles to high-rate traffic profiles.

- **Unsolicited Logon:** Terminals not passing traffic will log-off and restart transmission with an unsolicited logon mechanism when needed. This means that there is no idle capacity consumption.

- **Highest MODCOD Granularity and High MODCOD Support:** Ensures that each terminal operates at the highest MODCOD sustained by its link budget. Mx-DMA MRC supports 34 MODCODs up to 64APSK.

- **Low Roll-Off:** No unnecessary loss of capacity with 5% roll-off.

- **Self-Organizing Return Link:** The return link collects all inputs in real time and assigns the bandwidth autonomously to the entire population dynamically. The carrier size for each terminal is continuously adjusted in real time to deliver the required QoS while making optimal use of bandwidth. There is no need for predefined carrier planning.

- **Automatic Regrowth Control:** Ensures each terminal operates at the highest MODCOD, taking into account regrowth caused by BUC nonlinearities.

Multi-Service for Any Application

Mx-DMA MRC ensures the highest efficiency, scalability, and excellent performance for any type of application, fixed or mobile, and from very bursty traffic to fixed high bitrate services. It can provide SCPC-like efficiency and performance and MF-TDMA flexibility and scalability in a single waveform, minimizing operational complexity and maximizing statistic multiplexing.

- Applications with relatively lower bitrates, such as SCADA, IoT and those with relatively high degree of overbooking to accommodate bandwidth sharing such as SOHO and broadband access.
- Moving up the scale, Enterprise, SNG, Government, Cellular Backhaul and Maritime market applications have higher bandwidth requirements with less bandwidth sharing.
- For these highest data rate requirements, Mx-DMA MRC combined with the MDM5010 modem offers 300 Mbps on the return and more than 1 Gbps aggregate throughput (with a DVB-S2X forward).

MARKETS SERVED BY MX-DMA MRC

BROADBAND & ENTERPRISE

High QoS granularity for applications from broadband access, PoS to high-throughput Enterprise

Large populations operating at highest efficiency

RURAL CELLULAR CONNECTIVITY

Expand networks cost-effectively to large scale rural and ultra-rural communities

MARITIME

Ideal for very large networks, scaling from hundreds to many thousands of terminals: Fishing, Cargo, Cruise

GOVERNMENT

Reliable and efficient communications for disaster recovery and humanitarian missions

CELLULAR BACKHAUL

Well suited for large cellular backhaul and telco trunking applications with dedicated links

3G / 4G / 5G

LAND MOBILITY & SNG

Ability to mix many different antenna types and user profiles in a single self-organizing network

DEFENSE

Information assurance for mission-critical communications from intelligence gathering and joint operations to troop welfare

OIL & GAS ENERGY

Very high QoS ranging from bursty to large data rate traffic

EXPECT MORE FROM YOUR NETWORK

- **MORE CHOICES**
  Mx-DMA MRC marks the end of tradeoffs in network design, supporting a mix of services with common hardware in a shared return capacity.

- **MORE EFFICIENCY**
  Defy efficiency limitations. With the most efficient dynamic return technology, Mx-DMA MRC offers the highest level of intelligent, real-time bandwidth allocation at SCPC-like efficiencies.

- **MORE SCALABILITY**
  Mx-DMA MRC brings high performance and efficiency to thousands of terminals for the widest mix of applications and network requirements.

- **MORE PERFORMANCE**
  With very high performance of 100Msps reaching 300 Mbps of return throughput, combined with 800Mbps DVB-S2X, the speed exceeds 1 Gbps.

- **GREATER SERVICE FLEXIBILITY**
  Mx-DMA MRC offers a simpler way to manage complex traffic demand all on a single return link. With optimal bandwidth utilization, confidently deliver the best Quality of Experience.