

## SPACE-BASED DIGITAL COURIER

MDA is a pioneer in the development of systems to transfer massive amounts of data to and from remote or underserved locations. MDA's Cascade Data Services (CDS), in a strategic alliance with O3b Networks, brings together two powerful, unique, and highly complementary systems.

This *network of networks* features high data transfer rates at Ka-Band, using small ground terminals. CASCADE delivers true 100% global coverage via a scalable store-and-forward LEO (Low Earth Orbit) satellites, with instantaneous data rates of 2.1 Gbps. O3b Networks' equatorial constellation of 16 MEO (Medium Earth Orbit) satellites provides real time, continuous data transfer capability up to an aggregate rate of 10 Gbps from each satellite, between latitudes 45° N and 45° S.

CDS combines these massive data delivery capabilities to provide unparalleled transfer rates and coverage on a global scale. CDS is working with potential customers to demonstrate how this new communications paradigm can create exceptional operational value to their business.

### CASCADE

The CDS CASCADE satellite system is a constellation of low-cost LEO small satellites and ground terminals. The satellites receive data, store it, transit, and deliver the data to its destination, effectively serving as a digital courier in the sky. The CASCADE service enables delivery of extremely large digital data files, from tens to thousands of gigabytes per user, anywhere in the world, within hours.

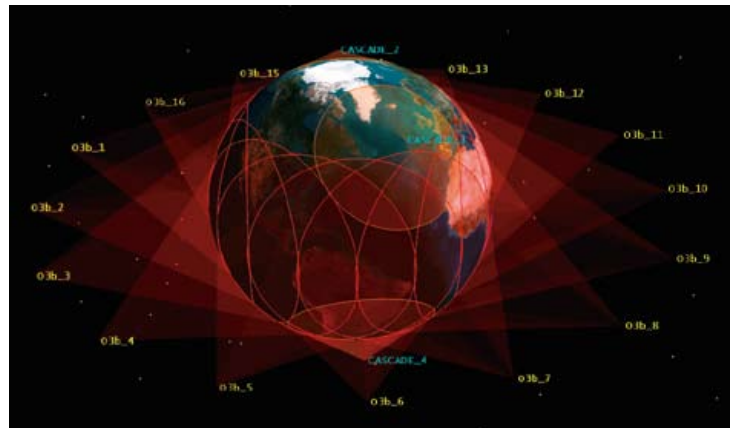
The potential cost savings offered by CASCADE are significant. CDS has qualified its critical technologies through a demonstration mission supported by the Canadian government. These technologies become the catalyst for disruptive change in how businesses affordably move huge volumes of time-critical data.

### O3b

A strategic partnership with O3b Networks has enabled utilization of CASCADE technology for both space and ground segment elements of the O3b network. CDS will be a primary strategic partner and reseller in the operation, application, and sale of data delivery services to select markets using the O3b network. O3b offers the reach of satellite and the speed of fibre at a fraction of the cost. Like CASCADE, O3b avoids the GEO transit delay that aggravates many interactive applications, and smaller terminals mean further cost savings.

### SYSTEM OVERVIEW

The CASCADE constellation of small (approximately 300 kg) LEO satellites will routinely service individual data sources and sinks sequentially on a prescheduled basis to effect simple but timely store-and-forward movement of large data packages, supporting point-to-point and point-to-multi-point applications.



*CASCADE's polar orbit provides access to high latitude customers O3b cannot serve, and augments the O3b system at lower latitudes.*

Each CASCADE satellite transfers data at a composite rate of 2.1 Gbps, equivalent to a data rate of 15 gigabytes per minute of satellite access time. Satellites will have more than 7 terabits of on-board storage. Data end-to-end fidelity is comparable to tape-to-tape copying, with pre- and post-processing techniques that ensure the end-to-end BER (Bit Error Rate) is no less than a nearly perfect  $1 \times 10^{-17}$ .

Marine-stabilized terminals enable communications with ships or platforms at sea, while fixed or mobile terminals enable delivery directly to or from rooftops or base camps. The user terminals are compact and easy to use, incorporating dish antennas up to 2.4 metres, depending on requirements. The terminals interface to any standard IP-based LAN, and no connection is required to any terrestrial infrastructure, enabling delivery direct from remote source to destination.



CASCADE is ideal for security conscious users, as data is never read, and the system supports acquisition and delivery of fully encrypted files. For customers and locations within its coverage area, O3b provides continuous wide-band communications using CDS proprietary dual-use terminals, by utilizing beam steering and tracking on its satellites.

## MARKET AND APPLICATIONS

CDS creates the ideal communications solution for users with global bulk data communication challenges through ready access to high-bandwidth connectivity. CDS services will also free up existing over-subscribed real-time satellite communications networks, and provide cost-effective solutions to a wide range of applications in



specific markets. The networks can support a broad range of data transfer requirements including, but not limited to, oil and gas exploration, surveillance and geospatial intelligence, streaming UAV video, logistics support, digital libraries and databases, Earth observation data and digital distribution.

## AFFORDABILITY AND IMPLEMENTATION READINESS

The CDS Service is simple and cost effective. CASCADE is fully scalable, and capable of providing full service with one satellite. As demand increases, the constellation will grow to improve overall throughput and reduce delivery latency. The CASCADE technology demonstration mission is fully funded and on track for launch in 2009. It will verify the key enabling technologies and ground operations, including the Ka-band RF transmit and receive chains, the high data rate space-qualified modulators and demodulators, the high capacity, low-power, low-mass on-board flash-memory data storage, and the end-to-end very large file transfer and error recovery method.

## SUMMARY

**Volume:** CDS can move data at upwards of 500 Mbps on a continuous basis using the O3b network and 1.5 metre marine terminals (and mobile equivalents). For higher rates, 2.4 metre terminals are available. CDS can also move data at 2.1 Gbps on an instantaneous, non-real-time basis using the CASCADE network.

**Price:** CDS operates as a Value Added Reseller, with bulk capacity agreements with O3b to provide services in conjunction with its CASCADE offering. The combined architecture creates the ability to further optimize the solution.



*CASCADE and O3b address the unique demands of an important and underserved niche market for cost effective global transfer of very large volumes of data on a routine daily basis.*

**Coverage Area / Service Type:** The O3b constellation will focus its real time service between 45° N and 45° S, complementing CASCADE's 100% global store-and-forward coverage. Beams on the satellites can be dynamically steered to put the capacity where and when it is needed.

**Availability:** Funded development is underway and O3b will launch in 2010. The CASCADE network will begin service in 2012. Significant investments from major technology and Internet companies are funding this disruptive business initiative.