

GOVERNMENT AND DEFENSE FIXED COMMUNICATIONS

Application Note
Government and Defense
Fixed Communications



Satcom for Government and Defense Fixed Communications

Fixed Satellite Communications are used for multiple applications within government and defense operations. The fixed communication infrastructure is the permanent or semi-permanent backbone link between headquarters and remote operation sites. In many cases these sites are located in hotspots or remote areas around the world that have no access to terrestrial communication infrastructure.

Push more data through the available satellite bandwidth at optimal link availability

The amount of data, voice and video exchanged between the headquarters and remote sites has grown substantially along the wide number of applications.

Government and defense customers continuously seek solutions to increase satellite link efficiency, to find available satellite bandwidth and to drive down satellite bandwidth costs. Whilst in operation the satellite link needs to be available at all times to assure mission critical communications.

Government and Defense Applications

Fixed Satellite Communications infrastructures are deployed for a wide range of applications within government operations. The fixed communications establish a backbone link between headquarters and remote sites combining a number of services that are key to the success of the operation and the welfare of the deployed personnel.

Newtec has a track record of fixed communication installations over satellite, linking remote bases in theatre, humanitarian missions, election polling stations, schools and embassies around the world.

Applications for fixed communications are:

- ISR Data Backhaul and Exchange Networks
- Morale, Welfare and Recreation
- Disaster Recovery Networks
- Multi-Service Government Networks
- Border Security and Surveillance
- Mission Support Networks
- National Election Networks
- Education, Distant Learning and Scientific Networks
- Civil, Humanitarian and NGO Networks
- Embassy Networks

Global Reach and Fast Deployment

Humanitarian missions into man-made or natural disaster areas, duty at sea and peacekeeping operations take government and defence personnel to remote locations where often terrestrial communication infrastructure is unavailable, or has been destroyed.

Through Newtec technology a satellite link can be set up quickly anywhere in the world, independent of the location on land or sea. First essential communication can be established to assess the situation at hand and take appropriate actions. A permanent link over satellite allows the agencies to run their operations exchanging video, voice and data without any interruption. Once the network is in place extra remotes can be put into operation simply at any time.

Best-of-Trade Equipment and Technology

Newtec can reflect on a track record of fixed satellite network installations worldwide for a wide range of civil, state and defense applications.

Newtec has a rich portfolio of state-of-the-art COTS products and solutions fit for fixed government and defense applications. These products serve as building blocks or turnkey systems for satellite networks. The Newtec equipment, OEM boards and software have successfully been integrated in diverse solutions and configurations for fixed networks over satellite.

The configuration of these networks combine reliable COTS equipment (IP/Ethernet Based SCPC and MF-TDMA hubs and modems as well as broadcasting modulation equipment), efficiency technology (FlexACM®, Bandwidth Cancellation, Clean Channel Technology™, Cross-Layer-Optimization™) and network optimisation software (shaping, acceleration, datacasting).

Newtec has its production center in Belgium and is in full control of the production and design process which translates in the outstanding reputation for its quality and reliability in the satellite market.

PROFESSIONAL SATELLITE EQUIPMENT

- Modems
- Modulators
- Demodulators
- Hubs
- Frequency Converters
- Redundancy Switches
- VSAT



NETWORK OPTIMIZATION TECHNOLOGY

- Acceleration & Compression Software & Hardware
- Traffic Shapers
- Satellite Bandwidth Management
- QoS & Prioritization
- Multicast & Datacast
- File-push

SYSTEMS

- Professional & Consumer VSAT
- Multi-service Exchange over Satellite (video, data, voice)
- High Speed Satellite Hubs



SATCOM OEM BOARDS

- Modulation
- Demodulation
- Frequency Converters



IP CORES

- IP Cores for Satellite, Terrestrial & Broadband Wireless
- Convolutional Turbo Codes
- LDPC Codes
- Turbo Product Codes

Figure 1: Newtec COTS Product Portfolio with professional satcom equipment, network optimization technology, hub systems, OEM boards and IP cores

End-to-End Efficiency for Milsatcom Networks

Newtec satcom equipment is based on standards such as DVB-S2 and the upcoming DVB standard S2 Extensions to enable interoperability between communications over satellite

Newtec's professional satcom equipment is based on DVB standards. Kick-started by Newtec, key players in the satellite industry have called for a new satellite transmission standard (S2 Extensions) to extend the existing DVB-S2 standard.

Open standards such as **DVB-S2** and **S2 Extensions** allow for interoperability and avoid vendor lock-in. Today S2 Extensions already provide gains up to 37% compared to DVB-S2. The support of Wideband technology adds another 20% to the equation. These gains exceed the results by proprietary systems in the market. Both standards are already available for new Newtec hubs and modems.

Two migration scenarios towards the new standard are possible:

For Newtec DVB-S2 equipment already deployed in the field, Newtec provides **Clean Channel Technology™** as a software field upgrade. As such Newtec customers can immediately benefit up to 15% gain compared to DVB-S2 through implementing a lower Roll-Off factor (5/10/15%) and an advanced filtering technology.

A Newtec S2 Extensions modem with the **Transmodulation** technology on board is put in front of the existing DVB-S/S2 infrastructure. As such the satellite link is fully optimized with the S2 Extensions efficiency gains and the Newtec modem takes care of the transmodulation to DVB-S/S2 to support the existing installed base equipment (receivers, IRDs etc.)

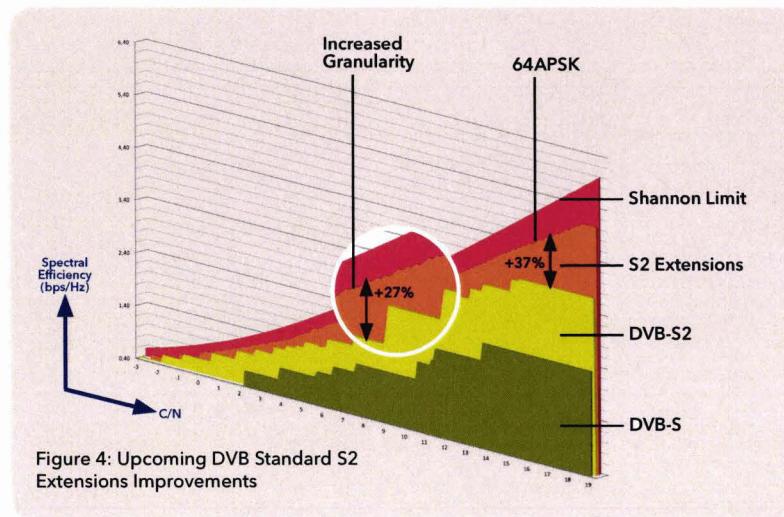


Figure 2: Upcoming DVB Standard S2 Extensions Improvements

7 Improvements in S2 Extensions

- Smaller Roll-Offs
- Advanced Filtering of Satellite Carriers
- Increased Granularity in MODCODs
- 64APSK Support
- Linear and Non-linear MODCODs
- Better Implementation of MODCODs
- Wideband Support

Scalable Multi-Service Hub

Through the Newtec Multi-Service hub both large camps, small sites, government offices, schools and embassies can be connected with a common DVB-S2 or S2 Extensions forward satellite carrier in order to establish access to different data, video or voice services.

By aggregating the data traffic in a common forward carrier and combining equipment in a single hub, important CAPEX and OPEX savings can be made. Extra bandwidth gains are achieved by implementing Newtec's FlexACM®, Clean Channel Technology™ and Cross-Layer-Optimization™ technologies on top of the Multi-Service network.

The return technology can be SCPC or MF-TDMA (or a combination) with FlexACM depending on the return rates, size of the remote or the configuration of the network (Point-to-Point, Point-to-MultiPoint).

The Newtec Multi-Service hub provides reliable 2-way IP connectivity through a versatile, scalable hub and cost effective and low power consumption remote terminals. The networks contains management functions for monitoring and control, SLA Management, QoS and Fair Use Policy.

The Multi-Service network also allows the government or defense service provider to provide IP access services in a direct way (VSAT) or an indirect way (Backhaul, WiMAX, Trunking) to end-users in theater or to missions in the field.

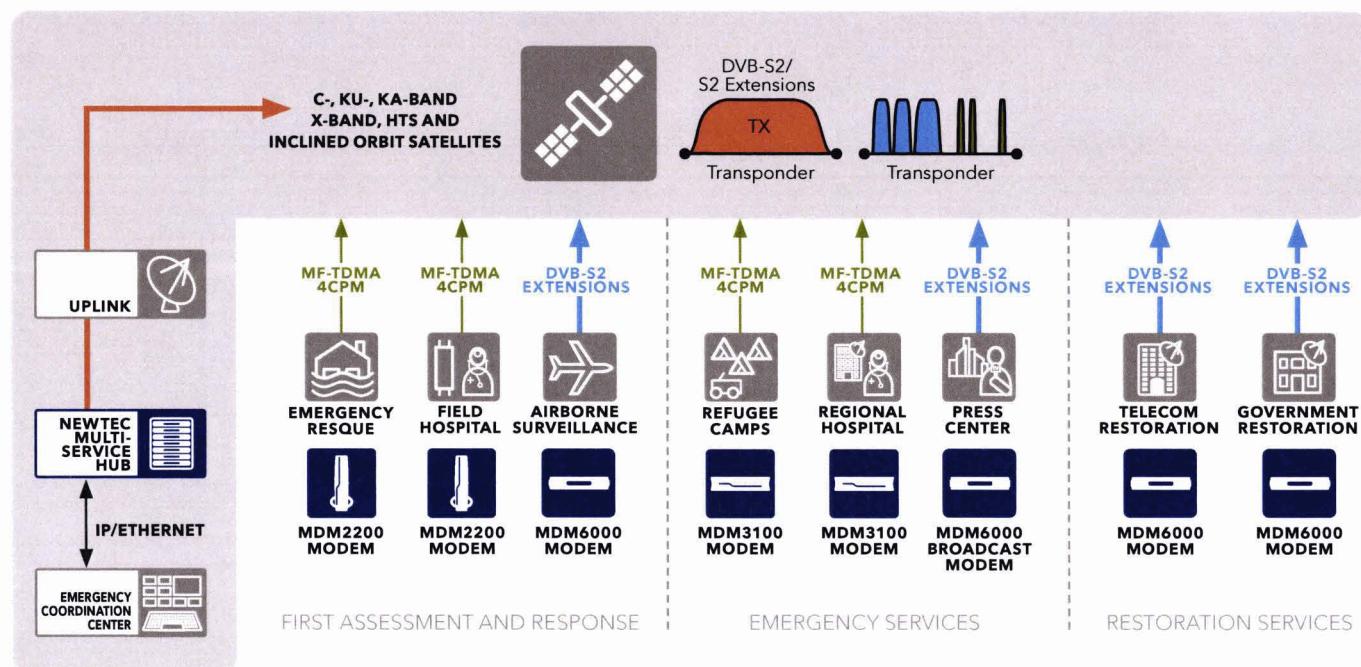


Figure 3: Newtec Multi-Service Hub Example for Disaster Recovery that connects refugee camps, hospitals, press centers and government offices

Double Throughput in Same Bandwidth

Both the amount of (video, voice an data) traffic and the number of government and defense networks over satellite have increased substantially. The boost in rates needs to be balanced with the lack of satellite capacity over some areas of operation.

Dedicated technologies by Newtec such as FlexACM®, Bandwidth Cancellation, Clean Channel Technology™ and Equalink® pre-distortion are used in a large number of these networks to achieve maximum throughput independent of the selected satellite. At the same time important OPEX reductions can be accomplished.

FlexACM uses the full capability of DVB-S2/S2 Extensions and combines it with different technologies to get as much data

through the same satellite bandwidth as possible.

FlexACM will auto-adaptively set modulation parameters to the optimal point and overcomes distortion, noise and variation in the satellite link. Newtec gets as close to the zero margin limit as possible allowing the full use of the satellite link. Through FlexACM the data rates between uplink and remote sites can be doubled in the same bandwidth without the need to acquire extra satellite capacity.

Newtec's FlexACM® doubles the data throughput for fading sensitive satellites (X-, Ku-, Ka-band, HTS) and Inclined Orbit Satellites

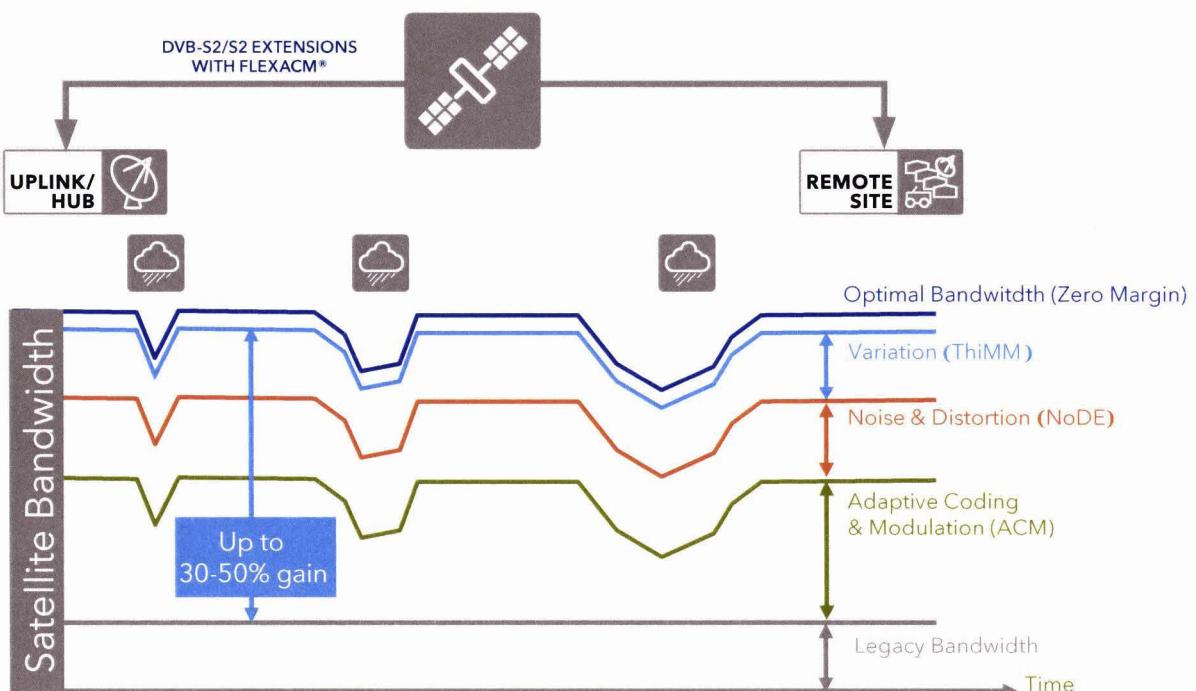


Figure 4: Newtec's FlexACM® combines different technologies to increase throughput over satellite

Optimal Service Availability over Variable Conditions

Even in harsh and hostile conditions it is important to have government and defense communication lines over satellite available at all times to exchange mission critical and live-saving information.

However, fading conditions could seriously disturb the satellite transmission and lead to temporary link losses. Fading conditions could be due to different circumstances: the choice of satellite (Inclined Orbit, HTS), frequency band (Ku-, Ka- and X-band), environmental (rain, dust) or interference (between two adjacent satellites).

Thanks to the auto-adaptive technology incorporated inside Newtec's FlexACM® these fading conditions will no longer interrupt the transmission between the hub and remote sites nor result in the loss of data.

In fading conditions FlexACM will switch to a more robust modulation and provide optimal availability. As soon as fading conditions are over FlexACM technology automatically switches back to maximum efficiency. During the entire operation it is possible to sustain Committed Information Rates (CIR).

Other technologies such as S2 Extensions low SNR implementation and Automatic Uplink Power Control on board Newtec hubs and modems will increase the availability in order to answer the most demanding Service Level Agreements (SLAs).

Moreover service priorities (e.g. video, data, voice) and Quality-of-Service policies can be auto-adapted on-the-fly depending on the bandwidth availability through Newtec's Cross-Layer-Optimization™ technology.

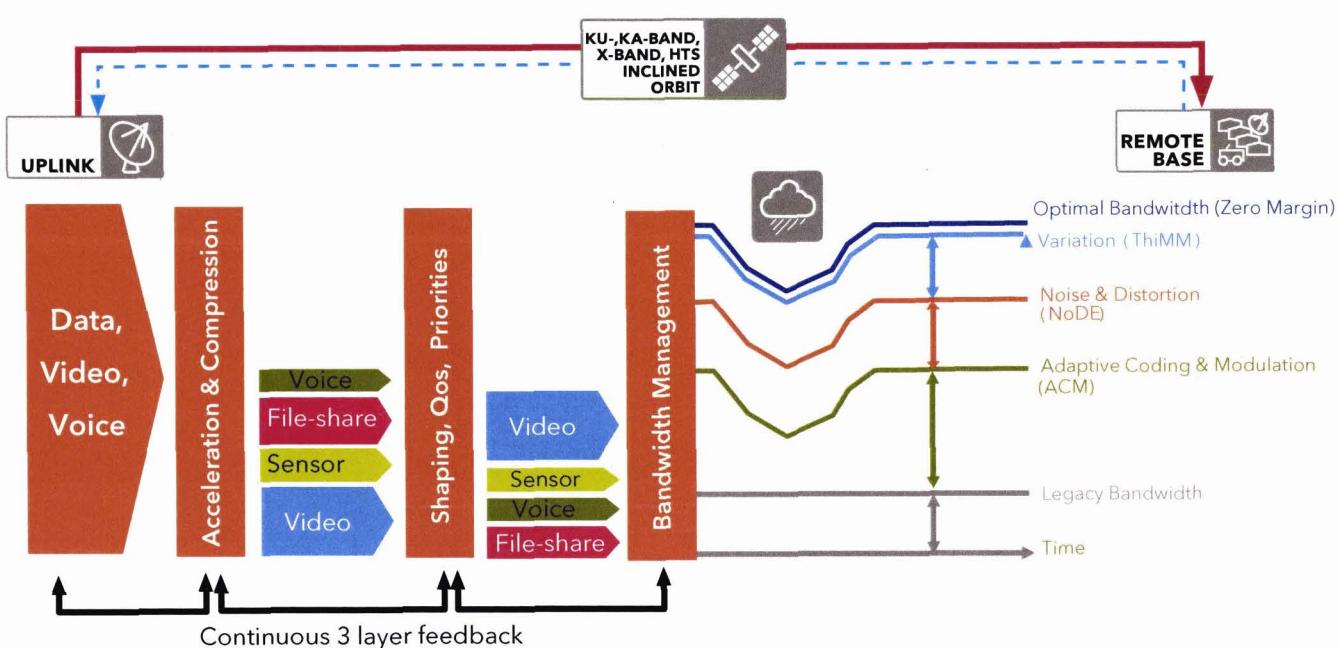


Figure 5: Newtec FlexACM and Cross-Layer-Optimization technologies optimize service availability over satellite

Increased Flexibility to Support Operational Efficiency

Flexibility is a key asset for government and defense satellite communication equipment in order to anticipate the continuous changing missions, services and areas of operation.

Through Newtec technology new remote sites can easily be added to the network. Data, voice or video services for different government applications are aggregated in a single carrier to get maximum efficiency out of the satellite link.

At any time these services can be removed, added or replaced. Moreover, the different services and applications will get a prioritization scheme in order to ensure critical mission information to pass first.

Newtec's hub equipment houses the unique Bandwidth Manager feature where both the IP and the satellite segment can be shaped. Individual customers are flexibly added or

removed from the same network. Different services (Internet Access, VoIP, etc.) can be combined in the same satellite carrier with separate Service Level Agreement (SLA) requirements and rate options. Both Committed Information Rates (CIR) and Peak Rates are offered in an adaptive satellite environment at various speeds.

Newtec satellite hubs with bandwidth management and shaping technologies allow for flexible network models to support improved operational efficiency

Whatever scenario the government and defense service operator selects, the Bandwidth Manager allows to flexibly build network models dedicated to increase the operational efficiency.

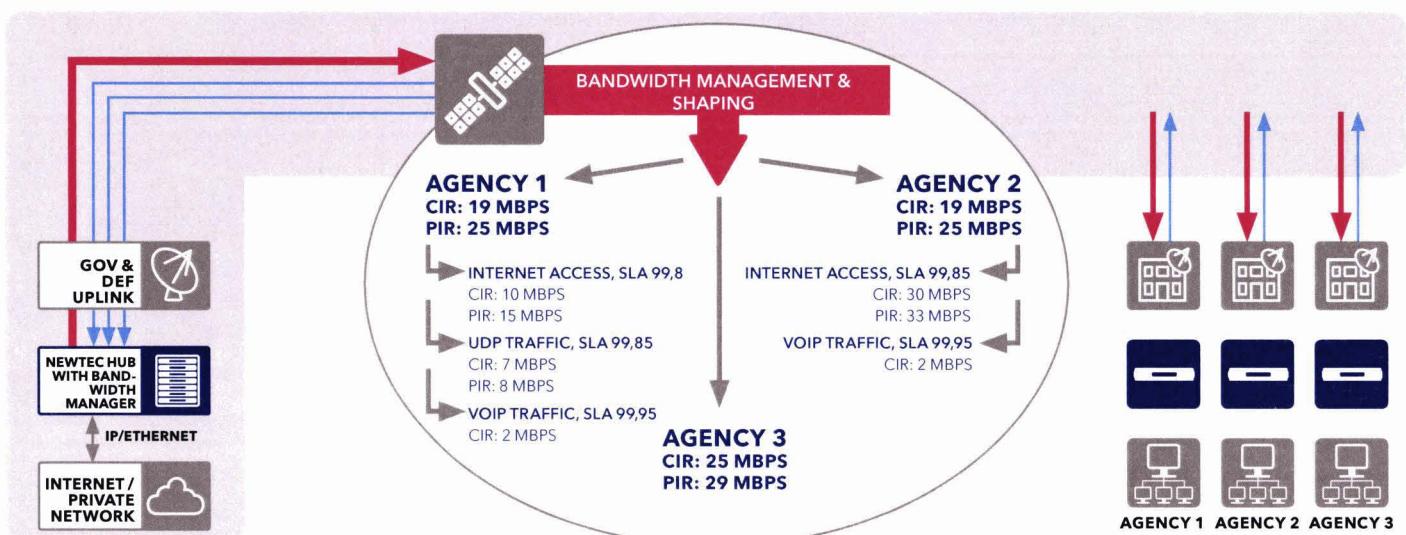


Figure 6: Newtec satellite hubs allow for flexible network configurations to support improved operational efficiency

Support of Video, Voice and Data

Government and Defense satellite communication are used for tactical, administrative, mission support, scientific or welfare purposes. These various services are a combination of voice (Telecom, VoIP), video (surveillance, broadcasting, video conference, training movies) and data (sensor, ERP, administration, mail, browsing). Most of these streaming and file-transfer based services have converged towards IP.

Newtec has more than 28 years experience as market leader in transport of video, high data throughput, broadband and voice links over satellite: from broadcast distribution and contribution to IP trunking, internet access and telecom backbone applications.

Through a multiservice platform the different government and defense services over IP can be combined either in the hub or the remote into a single carrier for efficient transfer over satellite at optimal service availability.



MISSION SUPPORT



WELLFARE



TELECOM



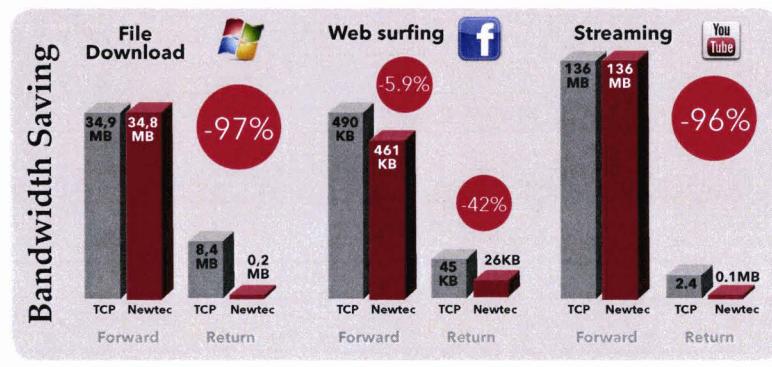
SURVEILLANCE

Increased User Experience for Remote Sites

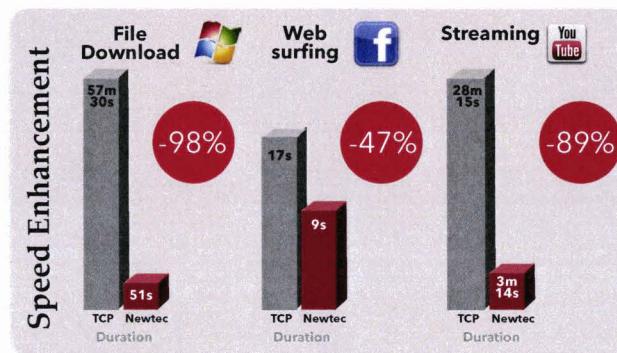
For true broadband experience over satellite the Newtec modems and terminals in government and defense networks implement the most efficient technologies, such as FlexACM® in the forward link, adaptive return technologies and embedded IP traffic enhancement software (aka Cross-Layer-Optimization™) such as shaping, TCP acceleration, pre-fetching and compression.

Next to an improved end-user experience, considerable cost gains can be achieved.

- Reduction of Webpage Load Time up to 60%
- Reduction of File Download up to 90%
- Up to 35% Bandwidth Reduction



PC with Win Vista SP1, Internet Explorer 8.0, SLA: 10 Mbps FWD / 1 Mbps RET



Improved User Experience
PC with Win Vista SP1, Internet Explorer 8.0, SLA: 10 Mbps FWD / 1 Mbps RET

Figure 7: Newtec Network Optimization Gains

Reliable and Efficient Datacasting

Newtec's Datacast solution provides efficient store & playback support over satellite and is robust against outages

Extensions FlexACM® forward over satellite. The content is stored on the server located at the remote.

Multicasting government and defense content towards remote sites and mobile platforms with Newtec's Datacasting Software will immediately result in important efficiency and OPEX gains. The transmissions towards remotes are aggregated in a common efficient DVB-S2/S2

The reliability of the datacasting (ISR video and sensor feeds, Welfare video, etc.) is enhanced by the software's partial retransmission capabilities. Only the detected missing fragments are retransmitted which provides important OPEX gains for services on-the-move or those suffering from fading or interference conditions.

Newtec's Datacasting Software also has the following possibilities:

- Dynamic Scheduling & Prioritisation
- Authentication, Authorisation & Accounting
- Automated Content Distribution via "hot folders"
- Monitoring & Control

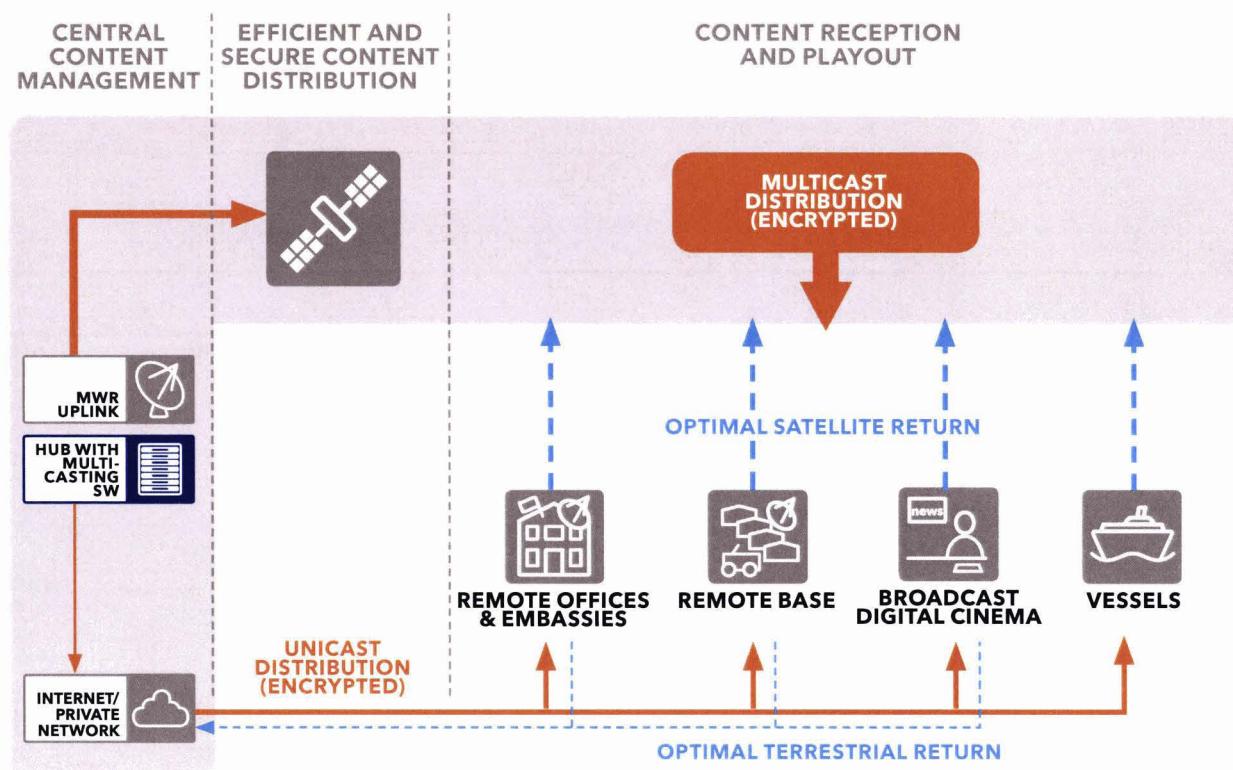


Figure 8: Example of Newtec's Datacasting Software for Efficient and Reliable Delivery of MWR Content

Countering Increasing ISR Demands

Intelligence, Surveillance, and Reconnaissance (ISR) systems are integral components of both national policymaking, border control and peacekeeping operations. In order for policy makers or operational headquarters to make correct assessments of the situation at hand, these surveillance and information exchange systems have to provide users with a detailed and comprehensive understanding of issues based on information from all sources. These sources rely heavily on video and sensor technologies.

The data-hungry sensor and video technologies have contributed to an insatiable demand for satellite bandwidth. As satellite capacity is expensive and not always available over some regions Newtec provides new ways to get more

ISR information over satellite links at lower OPEX and CAPEX. Technologies such as FlexACM, network optimization and multicasting efficiently deliver video and sensor feeds from the remote site to the mission control headquarters.

Moreover Newtec has a vast experience in video broadcasting and multimedia exchange systems over satellite to provide video and sensor connectivity from different sources towards the mission control headquarters.

Both bursty traffic (e.g. motion activated CCTV feeds) and continuous video ISR feeds are supported through the multiservice gateway.

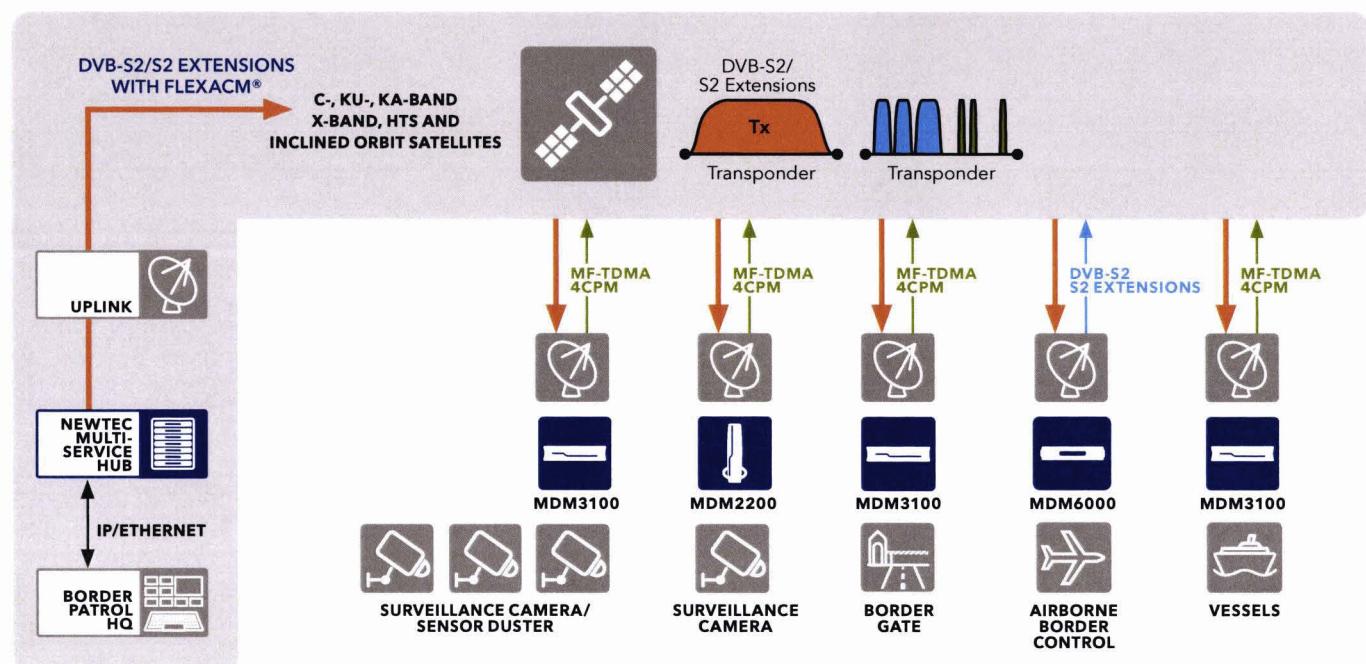


Figure 9: Example of ISR Network for Border Control with combination of bursty CCTV traffic and continuous video feeds coming from different sources

More Information:



Send a mail to: sales@newtec.eu



Visit our website: www.newtec.eu/applications/government



Contact us: **Newtec Cy N.V.**

Laarstraat 5

B-9100 Sint-Niklaas

Belgium

Tel: +32 (0)3 780 65 00

Fax: +32 (0)3 780 65 49

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Europe	North-America	South-America	Asia-Pacific	China	MENA
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