RPAS & MANNED AIRCRAFT

Satcom Relay for Manned and Unmanned Airborne Platforms

Unmanned aerial vehicles and manned aircrafts are increasingly being used as vehicles to capture intelligence data for defense, state and civil applications. The aerial vehicles are equipped with technology to collect both video and sensor data which are communicated to a mission control center for further processing. When outside the reach of direct data relays due to distance or environment (e.g. mountainous regions) satellite communications is used for Beyond-Line-of-Sight (BLoS) communication.

Getting as much sensor data and video as possible through the available bandwidth is key for BLoS. Only with the highest possible efficiency can increased data and traffic demands be attained whilst still taking OPEX costs into consideration. During operations the satellite link needs to be available at all times to assure mission critical communications and not endanger ground operations.

Solution Benefits

Get more sensor data and video through the available satellite bandwidth for Beyond- Line-of-Sight airborne communications at maximum service availability.

Defense, Civil and State Applications

Manned and unmanned airborne platforms are deployed for a wide range of operations within government, state and civil applications and are key enablers for achieving full situational awareness. The more data that can be collected the better the assessment of any given situation. This leads to the most appropriate actions being taken

The applications where UAVs and manned aircraft are deployed range from Intelligence, Surveillance and Reconnaissance (ISR) missions to border patrol, emergency response support and environmental monitoring..

Increasing airborne ISR & border patrol missions, as well as bandwidth hungry sensor and video technologies, calls for efficient satcom solutions for BLoS relay.

Bandwidth Hungry ISR Data and Video

In ISR and border patrol operations, detailed information is required in order to make correct decisions.

Different video and sensor technologies sap capacity on the satellite transponder. Raw HD video data and sensor technologies such as hyper- and multispectral imaging, infrared, etc. already account for hundreds of Megabits to a couple of Gigabits worth of content. Part of the data can be pre-processed on board or analyzed after the mission. But for real-time operations a maximum throughput is needed over the satellite RF channel to enable quick and accurate decision taking.

	MPEG 2	MPEG-4 (H.264)	HVEC (H.265)
Standard definition (basic quality)	3-6 Mbps	1-2 Mbps	512 Kbps
Standard definition (high quality)	9-21 Mbps	5-8 Mbps	2-3 Mbps
High definition	31-42 Mbps	10-20 Mbps	5-10 Mbps

Figure 1: Video throughput sizes using different compression technologies and resolutions

DIALOG

Newtec ◄ iDIRECT
powered by

Best-of-Trade COTS Equipment

ST Engineering iDirect has a track record of installations in both unmanned and manned aerial vehicles and has an installed base of thousands of units in both video broadcasting and IP data communications over satellite. These are for both civil and government applications. Over the years ST Engineering iDirect has built an outstanding reputation for its quality and reliability.

The ST Engineering iDirect modulation units (hub, modems and boards) are based on DVB-S2/S2X, the adopted standards for communication over satellite for both video and data, allowing full interoperability.

Figure 2: ST Engineering iDIrect modem with DVB-S2 /S2X and FlexACM® technology on board.

Easy Integration

ST Engineering iDirect modem units, (de)modulation and frequency converter OEM boards have successfully been integrated in satcom solutions for UAVs and manned aircrafts worldwide.
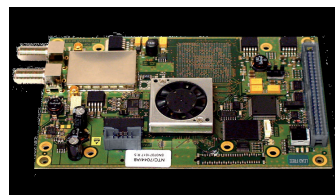

Figure 3: OEM board

Our hubs, modems and demodulators fit perfectly into rack space at mission control centers or in manned aircrafts. Both video and data can be transmitted through one modem in the same satellite carrier in the most efficient way.

Payload is critical. ST Engineering iDirect meets SWAP (Size, Weight and Power) requirements with the compact boards and modems to extend each ISR airborne mission reach and time.

ST Engineering iDIrect modulation and demodulation boards are integrated in aerial systems and terminals where payload and form factor are critical. The boards have the smallest form factor in the COTS market. Their light weight and low power consumption extends the aerial vehicle reach significantly.
.

DIALOG

powered by
Newtec ◄ iDIRECT

Not Your Typical VSAT (MF-TDMA) Network

With the growing throughput demands from the airborne platform to the ground, a traditional VSAT system with MF-TDMA return links does not suffice any longer. In order to support higher data rates a network design with SCPC links is required.

ST Engineering iDirect equipment with SCPC links in DVB-S2/S2X is required to support high data throughput with ISR video and sensor content.

Sensor data and video are relayed over the SCPC satellite link from the ST Engineering iDirect modem on board the aerial vehicle to the ST Engineering iDirect hub in the mission control center.

Our hub (DVB-S2/S2X) can support a single aircraft in a point-to-point configuration or multiple aircrafts in a star (point-to-multipoint) configuration. The common forward link to the aircraft is used for VoIP communication, internet browsing results and database searches by the engineers on board the manned ISR planes.
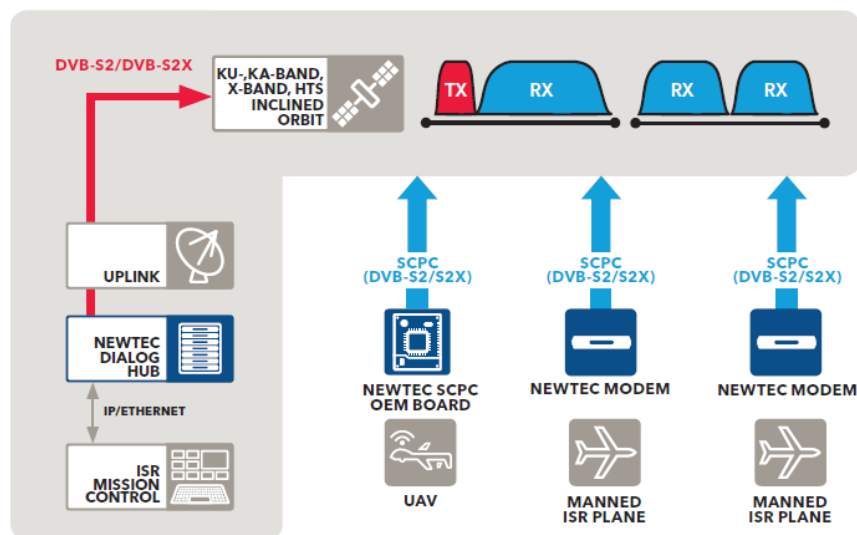

Figure 4: SCPC network design for Airborne ISR and border patrol platforms.

Double Throughput in the Same Bandwidth

In order to overcome the growing demand in ISR data and video relay, ST Engineering iDirect deploys FlexACM® technology in its equipment. FlexACM uses the full capability of DVB-S2/S2X 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. ST Engineering iDirect gets as close to the zero margin limit as possible, allowing the full use of the satellite bandwidth.

With FlexACM, video and data rates can be doubled in the same bandwidth without the need to acquire extra satellite capacity.

Double the data and video throughput without acquiring extra satellite bandwidth with FlexACM.
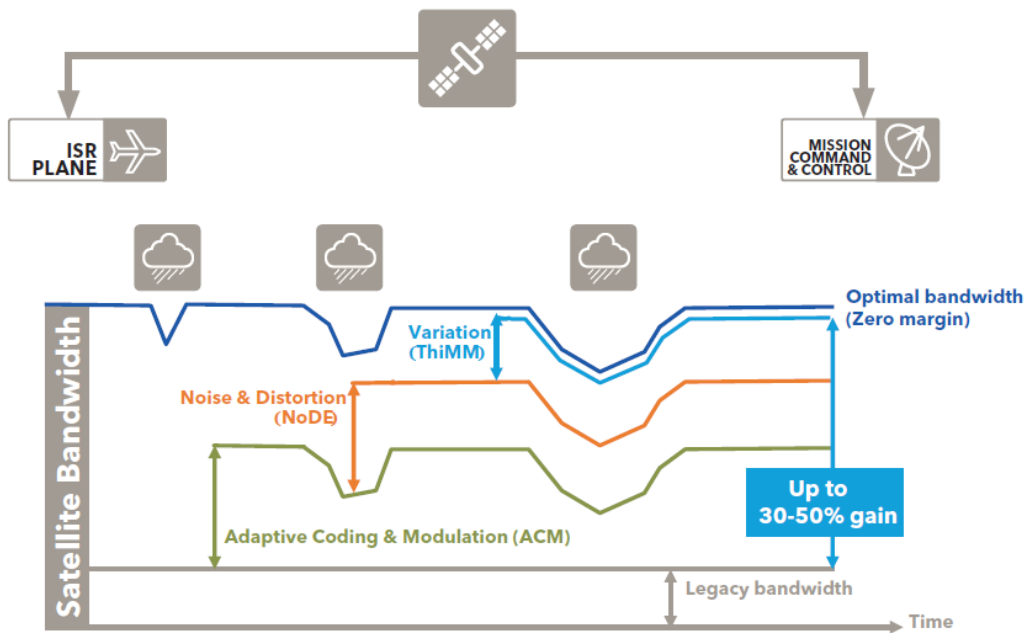

Figure 5: FlexACM doubles throughput even in adaptive satellite bandwidths

DIALOG

powered by
Newtec iDIRECT

ISR Data & Video Relay Optimization

Optimizing the data and video link between the aircraft and the ground station is a continuous process that needs to take changing conditions into consideration at all times

ST Engineering iDIrect was the first in the market to introduce Cross- Layer-Optimization technology. This technology is available as software (which can smoothly be integrated into existing infrastructures) or as part of our equipment portfolio.

Cross-Layer-Optimization auto-optimizes the data link by continuous interaction between satellite equipment, bandwidth management, shaping and acceleration technologies.

Through Cross-Layer-Optimization the satellite modulation equipment is in continuous interaction with Acceleration, Compression, Bandwidth Management and IP Shaping technology.

As soon as a satellite link condition changes the link will be auto-optimized following Quality-of-Service and priority settings without the loss of data or link/

Cross-Layer-Optimization is available for both Beyond-Line- of-Sight (over satellite) and Line-of-Sight (direct) Data Relays.
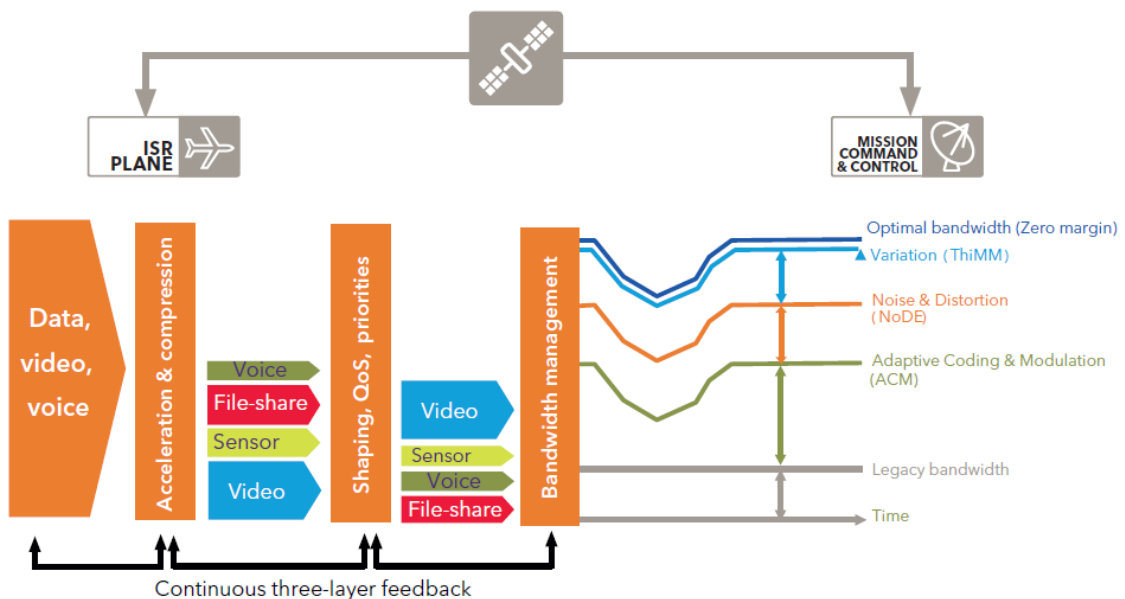

Figure 6: Optimal service availability and satellite link optimization with Cross-Layer-Optimization

DIALOG
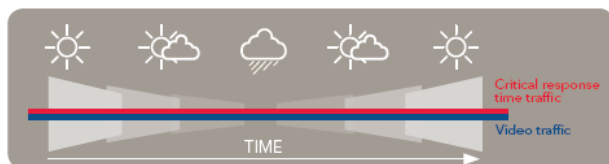
powered by
Newtec iDIRECT

Maximum Service Availability

During missions, in-flight unmanned and manned aircraft regularly encounter fading conditions which disturbs the transmission of video and data over satellite. Fading conditions can be caused by many different circumstances: the choice of satellite (inclined orbit, rain fade in Ku-, Ka and X-band), interference, or shadowing of the antenna (wing, tail, mountain, tracking loss.

Thanks to the auto-adaptive technology incorporated in FlexACM, fading conditions will no longer interrupt the transmission, nor result in the loss of video or data. In fading conditions FlexACM will switch to 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).

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

Multicasting ISR Data to Operational Users

After the reception of the video and sensor data in the mission control center, the ST Engineering iDirect satellite hub can distribute the content to operational users in the theater, or to the ISR data processing centers through our multicasting technology.

Payload is critical. ST Engineering iDirect meets SWAP (Size, Weight and Power) requirements with the compact boards and modems to extend each ISR airborne mission reach and time.

The system allows management of multicast traffic over the forward link at maximum efficiency. Services included in the our multicasting solution have a dynamic scheduling and prioritization, authentication and authorization, automated content distribution via 'hot folders' as well as monitoring and control functionalities.

DIALOG

powered by

Newtec ◄ iDIRECT