

BROADCAST DIRECT-TO-HOME (DTH)

Introduction

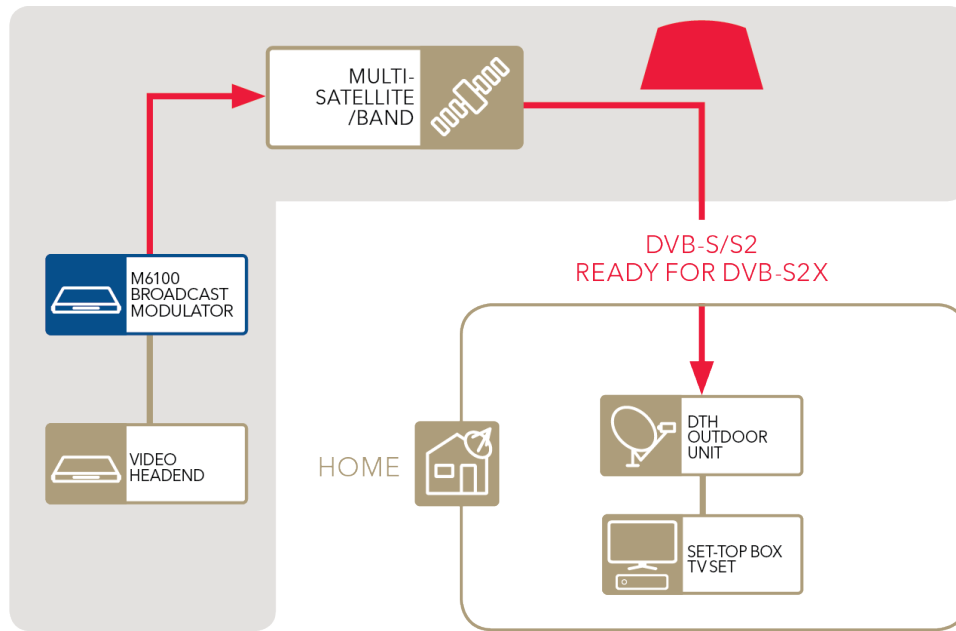
Content and advertisement income is what keeps the DTH operator awake at night. Bringing quality content to the largest possible subscriber base is one of the key factors for raising ever higher advertisement income. However, the bandwidth pipe over satellite is limited and could impose a hard limit on quality, subscriber coverage and growth. The advent of today's bandwidth hungry HDTV and tomorrow's UHD TV makes bandwidth even more precious. Fortunately, a new standard for efficient transmission is now available to DTH operators. Together with new video encoding schemes and new multispot and wideband satellite constellations, it provides the tools for tomorrow's DTH systems to be competitive with terrestrial cable, telco and DTT distribution systems.

Another means of optimizing revenue from DTH services consists of offering the DTH end customers additional services over the satellite channel. An obvious target is interactivity combined with broadband access.

Content distribution to professional users can be easily combined with DTH. As video content is abundant in the video headend, it's the right place for distributing content rights to, for example, cinema venues via file transfer. This Solution Overview details how the ST Engineering iDirect's M6100 Broadcast Satellite Modulator, the MCX7000 Multi-Carrier Satellite Gateway and the Dialog® platform support these three aspects of DTH.



MCX7000 Multi-Carrier Satellite Gateway



More HD content - Prepare for Ultra HD

Content is king

Content is the driving force behind pay-tv and advertising revenues. It's what customers want: ever more content, consumed at an ever higher quality on big TV screens. Both the increase of the number of TV channels and their quality (for example, HD and impending Ultra HD) create the need to distribute more content over satellite.

In many regions of the world, the required satellite capacity is expensive or simply not available. In order to minimize this cost, many networks have recently upgraded from DVB-S to DVB-S2. The introduction of DVB-S2X will further optimize satellite resources.

The M6100 Broadcast Satellite Modulator has the right features for squeezing the maximum throughput out of the available bandwidth, whether using the DVB-S, DVB-S2 or the new DVB-S2X standard.

The M6100 Broadcast Satellite Modulator and its assets for DTH

Clean Channel Technology®

Today's DTH is using DVB-S and DVB-S2 modulation. With the M6100 Broadcast Satellite Modulator in the uplink

station, satellite link efficiency can be improved by enabling ST Engineering iDirect technologies, such as Clean Channel Technology and Equalink® 3 pre-distortion, which are both available as a software license key.

Clean Channel Technology, provided as a field software upgrade to the M6100, allows for reduced roll-offs as small as 5%. Through advanced filtering technology, the carrier spacing can be reduced to up to 1.05 times their symbol rates, resulting in an immediate bandwidth gain of up to 14%. Most DVB-S/S2 set-top boxes on the market today can cope with lower roll-off factors with minimal degradation on performance. Equalink 3

Building upon the proven Equalink technology, Equalink 3 is the third generation pre-distortion solution from ST Engineering iDirect. Equalink 3 pre-distortion can improve bandwidth efficiency by up to 10% in a single carrier per transponder set-up, while preserving interoperability with any DVB-S/S2 set-top box.

Interoperability

The M6100 interoperates with all market-leading video headend systems and is compatible with encryption systems and video compression formats. To simplify installation, the M6100 supports both ASI and Gigabit Ethernet Interfaces for hooking up IP based encoders or multiplexers.

Built-in Transport Stream Analyzer

A built-in, real-time transport stream analyzer monitors the video headend programs and performs redundancy switching based on ETR-290 errors in the TS.

Built-in MPE data transport

The built-in MPE data transport capability on the M6100 can be used for transmission of data files towards the set-top boxes. An obvious application is software upgrades of the remote boxes. This MPE inserter is very efficient, replacing NULL packets in the video stream with valid data packets (opportunistic data insertion).

The M6100 Broadcast Satellite Modulator and its assets for DTH

The MCX7000 Multi-Carrier Satellite Gateway is the dense version of the M6100. It contains up to 4 modulators in one 19" rack unit height and supports the same feature set as the M6100. As an alternative to the M6100, it provides density and reduces power consumption in DTH uplink stations.

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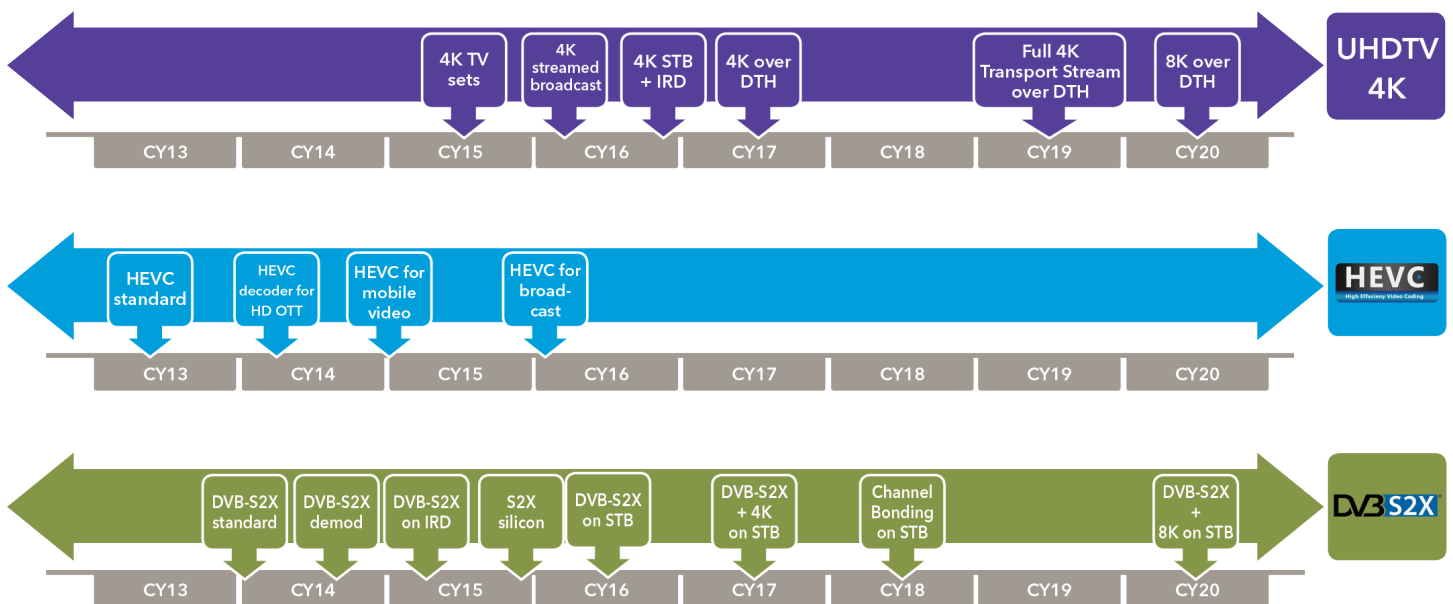
Get ready for HEVC and UHD TV

New technologies and standards

There are a number of new broadcasting standards for picture quality (UHDTV 4K/8K), compression (HEVC), satellite transmission (DVB-S2X) and interference mitigation (DVB Carrier Identification, DVB-CID) entering the market. There are real benefits to both the user experience and broadcaster business fundamentals to be gained.

Each of these new technologies and its associated standards is following its own roadmap. DVB-CID is available today, as well as DVB-S2X compatible set-top boxes. DVB-S2X services are expected to be on the market soon. HEVC decoders are being introduced in set-top boxes and TV sets, while UHDTV will be an evolutive process with features introduced over the coming years. The M6100 has been conceived with these technological evolutions in mind.

The M6100 can be configured to inject a Carrier Identifier, helping to reduce the impact of RF interferences on the satellite.



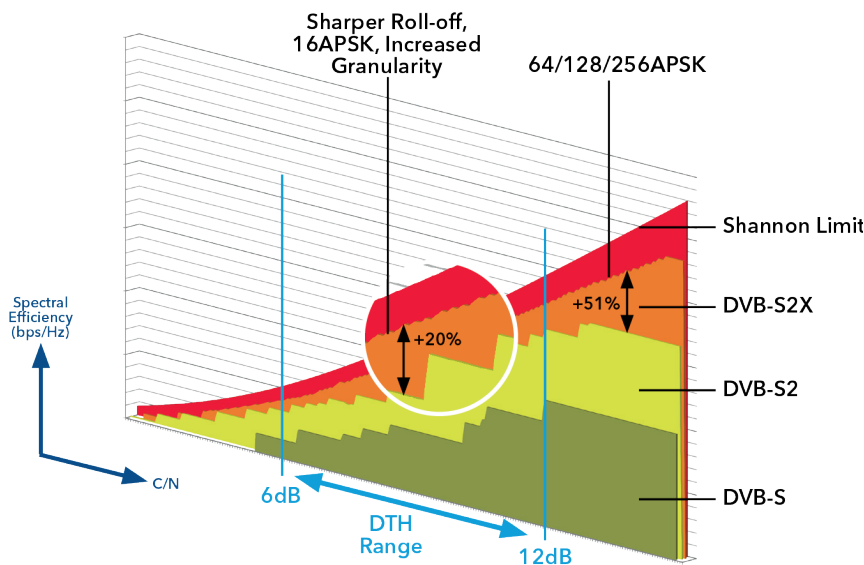
The M6100 is software upgradeable to the new DVB-S2X standard

This standard is available in TV sets and set-top boxes, together with the HEVC video decoding chips. HEVC has a 50% efficiency increase over H.264 currently used for HD. Premium services in HD and UHD TV will require more bandwidth and will benefit most from the HEVC and DVB-S2X efficiency increase.

DVB-S2X

The DVB-S2X standard fine-tunes both the physical and the upper protocol layers of DVB-S2, producing a highly attractive package for those service operators intending to launch new generation services, which in any case require new receivers. Combined with another advanced transmission technology, Equalink 3 pre-distortion, DTH network optimizations can result in a capacity increase of up to 20% at the same OPEX.

In practice, customers can use this increased efficiency to add more video channels to a transponder at the same cost, start distribution of Ultra HD channels, or grow their geographical footprint and increase service availability.



Improvements in DVB-S2X with benefits for DTH

Sharper roll-offs

Sharper roll-offs, already introduced as Clean Channel Technology on M6100, will see its usefulness for DTH, once DVB-S2X set-top boxes are available and new DVB-S2X services are offered.

Advanced filtering of satellite carriers

Part of M6100 Clean Channel Technology, this filtering allows for crystal-clear transmission signals and guarantees best quality uplink signal.

Increased granularity in MODCODs

A target service availability imposed by DTH Service Level Agreements (SLAs) requires a target SNR value. The SNR region applicable to DTH services in DVB-S2 and DVB-S2X extends from roughly 6 to 12 dB. In this region, the DVB-S2 MODCODs are limited. If the SLA requires a SNR value close to a step in MODCOD where the difference in spectral efficiency is big, this can result in a capacity loss of 10%. The finer granularity in MODCODs of DVB-S2X completely eliminates this drawback of limited number of MODCODs.

The future proof DTH system will support

- More SD and HD services
- Ultra HD services
- Video and audio compression standards MPEG-2, H.264, HEVC
- DVB-S2X set-top boxes
- In-band set-top box software upgrades

New MODCODs

The DVB-S2 standard specified MODCODs up to 8PSK for use in DTH receivers. DVB-S2X also makes 16APSK mandatory for DTH receivers. In the SNR region around 10 dB, some 16APSK MODCODs are more efficient than 8PSK MODCODs. This results in a capacity increase over DVB-S2 of around 5%.

Wideband support

Wideband transmission provides aggregated video streams of up to 72 Mbaud, resulting in one large single carrier to be transmitted over satellite. This allows the operator to saturate the transponder, thereby increasing the efficiency by up to 20% through non-linear operation.

Channel bonding

The statistical multiplexing of 7 HDTV channels in one Multiple Program TS over a 36 MHz transponder results in a typical efficiency gain of 20%. UHD TV channels, however, require double the bit rate, even with HEVC encoding, limiting the number of multiplexed channels in one regular 36 MHz transponder to three. With three channels, the statmux gain typically drops to 12%. In order to increase efficiency, bonding multiple carriers together into one big virtual carrier over several transponders, increases the efficiency gains of the video statistical multiplexing again up to 20%. This will ultimately be a key technology to distribute statmuxed Ultra HD streams containing ten or more TV channels in one transport stream of 160 - 220 Mbps. Channel bonding is supported on MCX7000.

Additional standard scrambling sequences to mitigate co-channel-interference (CCI)

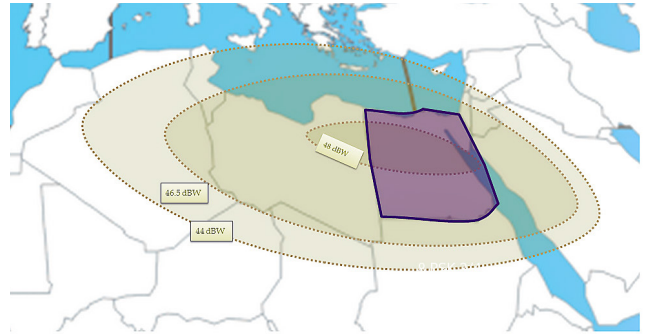
Extra scrambling sequences will make the synchronization in the receiver much more robust.

Improvements in DVB-S2X with benefits for DTH

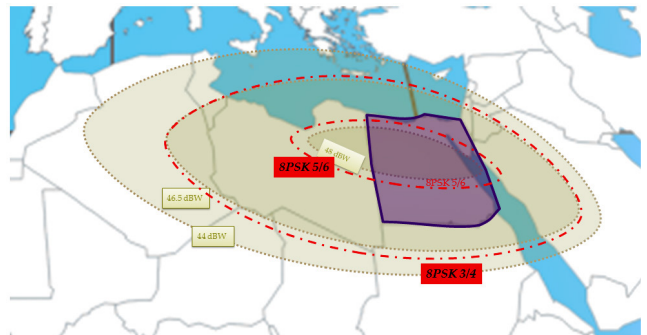
Consider the following example:

We want to cover the purple region with a satellite distribution system.

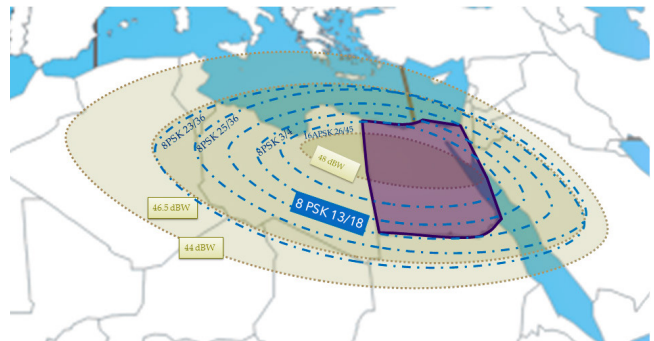
The satellite EIRP is depicted on the map and is deterministic of the transmission efficiency, service availability and size of the satellite terminal.



Using DVB-S2 20% roll-off, 8PSK 3/4 is the best match to achieve a defined availability with a certain terminal size. The higher modulation 8PSK 5/6 cannot be used since the full geographic region is not covered.



Using DVB-S2X with a higher MODCOD granularity allows the selection of 8PSK 13/18 modulation to match the target footprint much better. This MODCOD results in 16% bitrate gains compared to DVB-S2, without compromising service availability! Alternatively, customers can opt to achieve the same bitrate from DVB-S2X as DVB-S2, while benefitting from smaller dish sizes!



Broadcast DTH with Consumer Broadband Overlay

Interactive TV combined with broadband access

Another means of optimizing revenue from DTH services consists of offering the DTH end customers additional services over the satellite channel. An obvious target is interactive TV combined with broadband access.

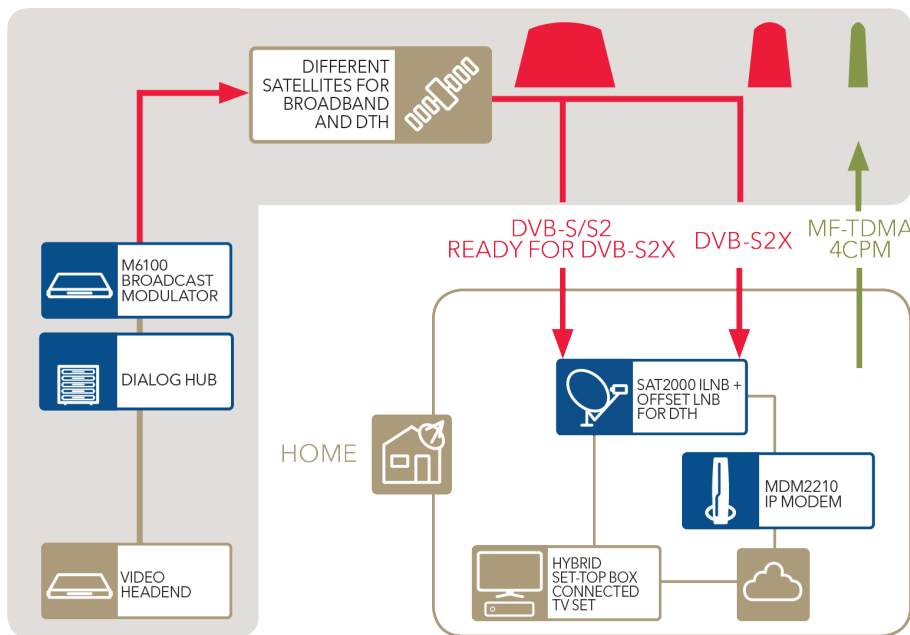
In some regions, broadband connectivity over satellite, combined with an interactive DTH service is a cost-effective solution, as well as being the only one which will provide 100% coverage. With broadband and DTH services over different satellites, the expensive DTH satellite bandwidth cost can be minimized.

Broadband is ideally sent over a Ka-band spot-beam satellite while DTH content is sent over a Ku-band DTH satellite. When broadband and DTH satellites are 6 - 13 degrees apart, the same antenna dish can be used for both services.

The Dialog Platform provides the right connectivity features for this market

- Support for multiple access technologies, modulations and ground equipment, providing the connectivity and associated QoS tailored to the service.
- The extra cost of the terminal is a few hundred dollars, in line with consumer acceptance.
- Proven technology, with networks providing Internet access to more than 100,000 households over the last 10 years.
- Built-in redundancy for highest uptime.

The availability of a return channel over satellite for Internet-connected TV (for example, the red button or other HBBTV applications), combined with broadband access is a valuable commercial asset in the DTH operator position vs. terrestrial alternatives. It allows for interactivity based on a wholly owned infrastructure. Its main asset is the 100% coverage in rural areas. Its main dependence is the availability of the right satellite constellation.



A future-proof Broadcast DTH with Broadband overlay system provides

- More SD and HD services
- Ultra HD services
- MPEG-2, H.264, HEVC
- Support for DVB-S2X set-top boxes
- In-Band set-top box software upgrades
- Broadband access for DTH customers
- Interactive DTH

The Dialog platform combined with the M6100 modulator is a future-proof solution with virtual limitless growth possibilities and is an essential part of the system.

Broadcast DTH with Consumer Broadband Overlay on Same Orbital Position

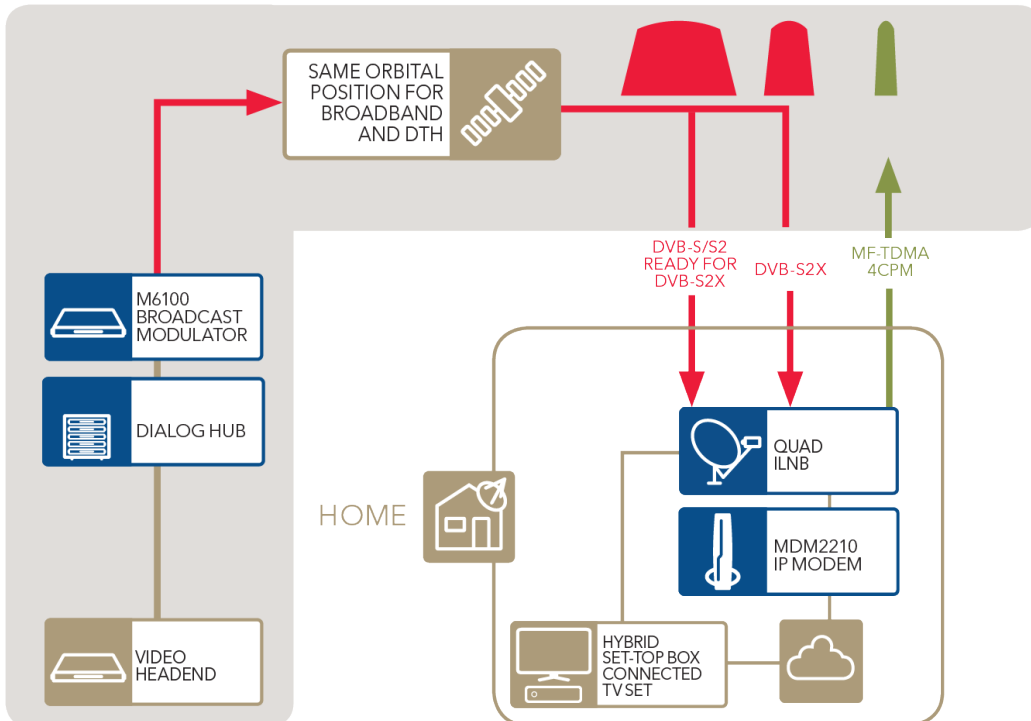
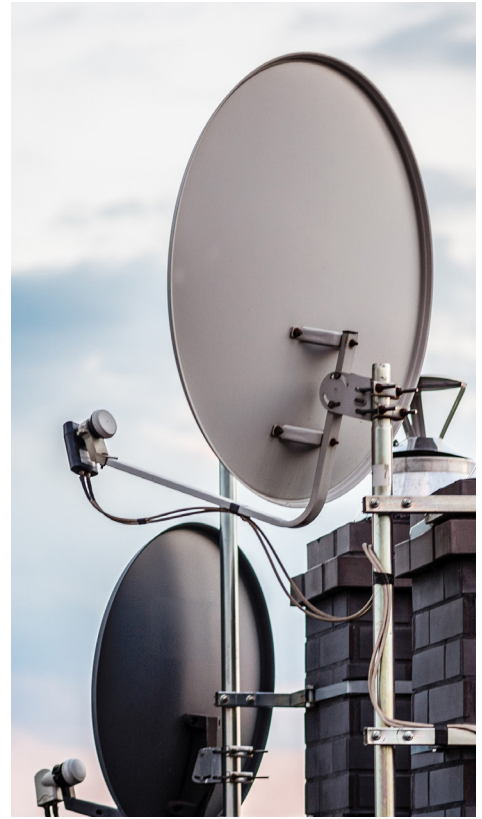
Quad iLNB

In case DTH and broadband services are working over satellite transponders at the same orbital position, ST Engineering iDirect offers a quad interactive Ku-band iLNB with built-in polarization setting.

One antenna dish and the interactive Quad iLNB is all what is needed on the outdoor side

MDM2210 IP Modem

The MDM2210 IP Modem and the Quad iLNB have been optimized as a pair for lowest terminal cost. The same broadcast DTH with broadband overlay system services are provided as with the two orbital positions constellation.





Broadcast DTH Combined with Content Distribution to Professional Customers

The module is designed for satellite-optimized file transmissions

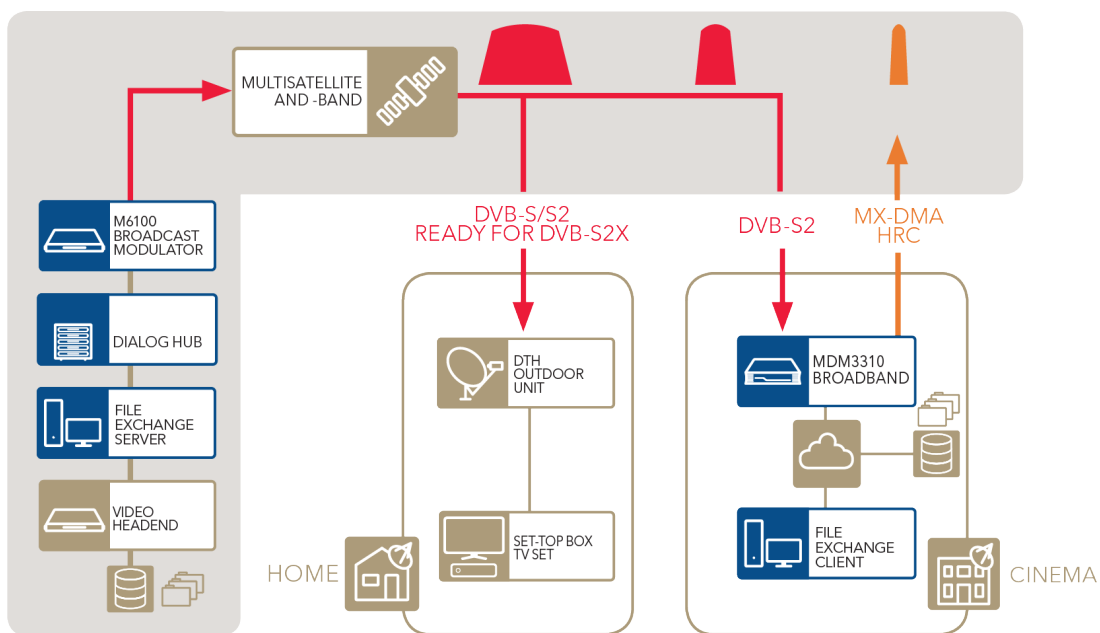
File exchange

Content distribution to professional users can be easily combined with DTH. In a lot of cases, the DTH operator owns the rights on the distribution of the video content to professional users. As content is abundant in the video headend, it's the right place for distributing this content to, for example, cinema venues via file multicasting. A DTH operator can use the Dialog platform for this file transfer, as well as for broadband and interactive TV.

As a return channel is in place, file unicasting from the theaters to the video headend is possible too. The Newtec's File Exchange module provides the operator with a tool to transfer error-free file based content. The module is designed for satellite-optimized file transmissions.

MDM3310 Modem

The Dialog platform can provide a very cost effective solution with MDM3310 modem. The MDM3310 provides 4CPM and HRC modulations used in an MF-TDMA or Mx-DMA® access mode for always-on connectivity.



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