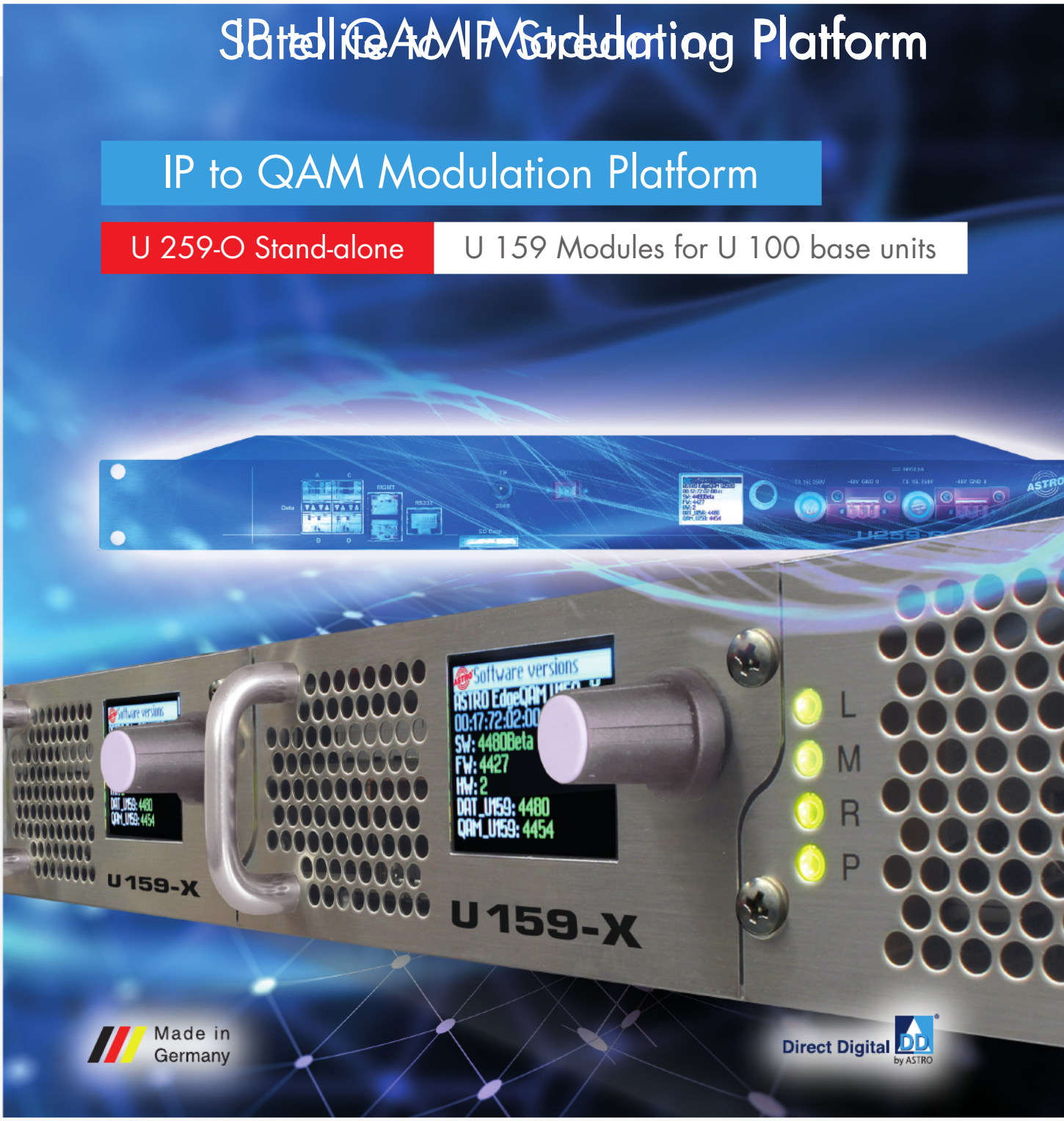
GOING FUTURE TODAY.

Satellite to IP Solutions

IP to QAM Modulation Platform

U 259-O Stand-alone

U 159 Modules for U 100 base units



Modular IP to QAM Modulation

A complete concept –
suited for different key markets!

Based on the U 100 head end series, the U 159 and U 159-X IP to QAM modules offers ultra-dense QAM modulation for cable TV networks with sophisticated features. The unique architecture of the U 100 head end series enables highest density with highest reliability for professional technical environments. Hard- and software based redundancy mechanisms are developed in close connection with our customers to meet the requirements for any

While the U 159 and U 159-X are plugin modules for U 100 base units, the U 259-O was designed with hardened components for outdoor street cabinet applications even at higher temperatures. It has all features of our well known U 159 module, capable of converting up to 64 QAM carriers out of the IP inputs. All connections and control elements are available from the front of a 19 inch housing, as also is the connector for local DC powering.

- up to 64 QAM channels per module
- flexible input configuration, 4 x 1G data interfaces
- reception of SPTS and MPTS (max. 256 IP receiver)
- high output level, low power consumption per channel
- excellent signal quality by Direct Digital technology
- integrated 20 dB test point
- static or dynamic NIT, NIT remapping

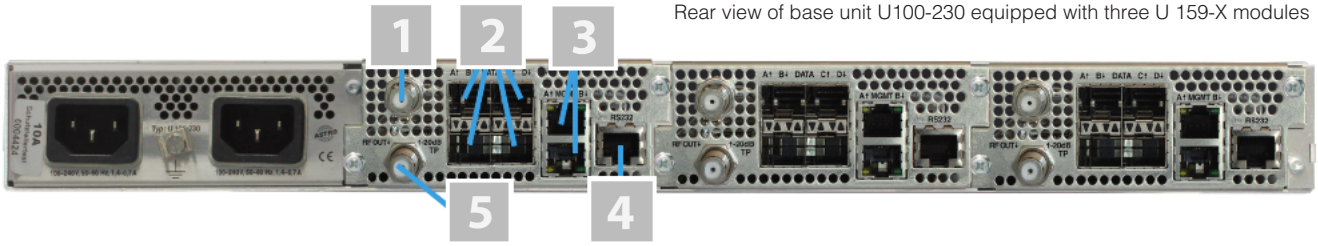
Broadcast

Cable Network Operators

Telecommunication

The U 159 module consists of the plug-in module with the receiving part, the TS processing and the QAM modulator and the active backplane with the RF amplifier, SFP ports and all further interfaces. The hardware is designed to enable the exchange of the plug-in module without affecting the wiring of the backplane, which makes life easier for the technicians on site.

Rear view of base unit U100-230 equipped with three U 159-X modules

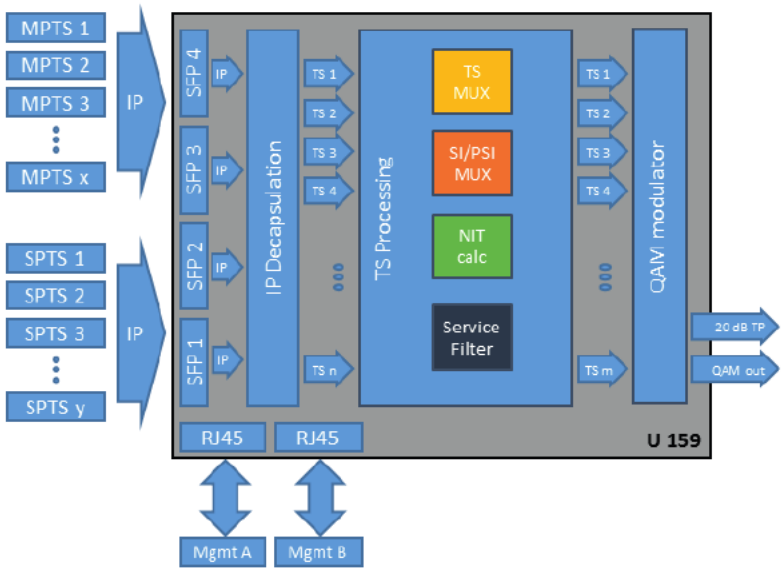


1 20 dB test point
2 4 x SFP slots for data interfaces
3 2 x RJ 45 management interfaces
4 Serial interface for R&D
5 RF output

The U 259-O is a 19 inch standalone device which features the U 159's backplane interfaces on the front panel plus an optical output.

Signal processing

- IP input SPTS / MPTS via four 1G SFP
- management via redundant management ports
- powerful transport stream processor for multiplexing, NIT calculation, filtering, scrambling
- FPGA based digital QAM modulator, each output channel separately configurable
- 20 dB test point per module



Modules

U 159

U 159-X

U 259-O

	U 159	U 159-X	U 259-O
Order number	380 159	380 305	380 278
Annex support	Annex A,C	Annex A,C	Annex A,C
Base unit	separate module, up to 3 in U 100-230 or U 100-48	separate module, up to 3 in U 100-230 or U 100-48	1 RU, outdoor version for cabinets
Number of carriers	16 (max. 64*)	16 (max. 64*)	16 (max. 64*)
Maximum number of input signals per data port	255	255	255
Number of data ports	1 (max. 4*)	1 (max. 4*)	1 (max. 4*)
Data rate per data portl	850 Mbit/s	850 Mbit/s	850 Mbit/s
Optical output	–	–	☑
Extended memory with higher operating power	–	☑	☑

Options (can only be installed in the factory)

U 159 B: Annex B only (w/o Annex A, C); order no. 380 270	–	☑	–

Licenses *)

U 159 BISS: Scrambling of QAM ch. according BISS; order no. 380 239	–	☑	☑
U 159 TS: Activation of transport stream anaysis, order no. 380 306	–	☑	☑
U 159 D: Interne QAM Demodulation und Überwachungsfunktion; Bestellnr. 380 279	–	☑	☑
U 159 MON: Monitoring des QAM Ausgangskanals; Bestellnr. 380 307	–	☑	☑
U 159 CSA: Scrambling of QAM ch. according CSA; order no. 380 253	–	☑	☑
U 159 8QCH: Extension by 8 QAM ch. (max. up to 64); order no. 380 259	☑	☑	☑
U 159 DP: Extension by 1 data port (max. up to 4), order no. 380 258	☑	☑	☑
U 159 FEC: Forward Error Correction (FEC), order no. 380 257	☑	☑	☑
U 159 MUX: Multiplexer, order no. 380 254	☑	☑	☑
U 159 RED: Internal redundancy function for input sign., order no. 380 256	☑	☑	☑
U RADIUS: Activation of RADIUS client server protocol, order no. 380 136	☑	☑	☑
U SSL: Activation of TLS protocol (SSL), order no. 380 133	☑	☑	☑

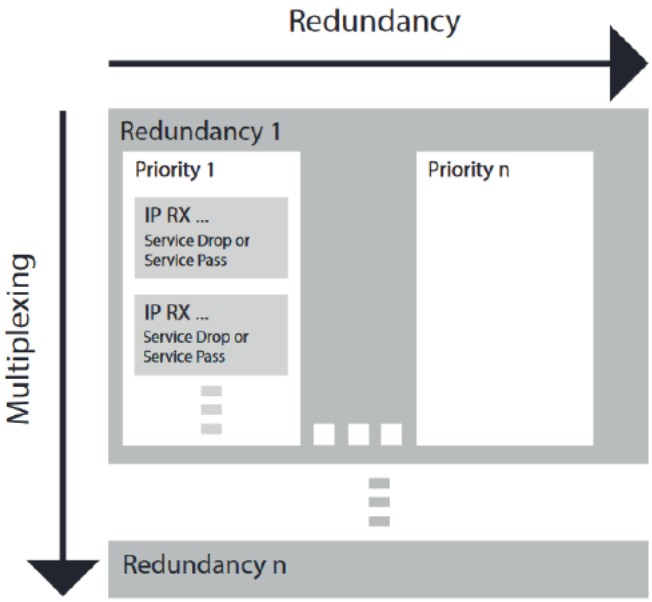
* license key needed

Accessory

U 159 SFP: SFP module, 1 Gbit; order no. 380 255	☑	☑	☑

Redundancy options

- N+1 or 1+1 hardware redundancy controlled by U 100-C management module
- active link redundancy with monitoring of the redundant signal link
- active source redundancy with monitoring of the redundant signal source
- each signal source can get different priority with adjustable hysteresis to avoid polling
- service based redundancy, i.e. one missing service in TS leads to switch over to redundant TS
- all redundancy switching options can be executed manually or automatically



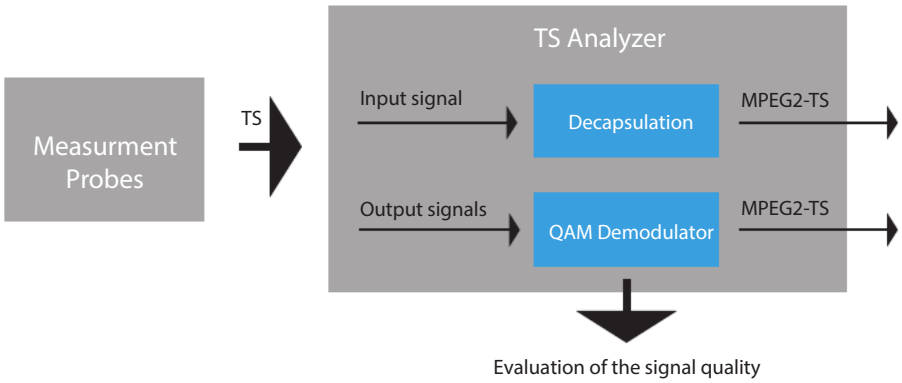
Onboard Monitoring

Monitoring and Analysis – without expensive measuring techology!

In the past, complex and expensive measuring technology had to be installed for powerful monitoring of the signal quality and meaningful error analysis. Thanks to an integrated monitoring and analysis module, ASTRO IP/QAM devices can now monitor their signal processing chain themselves and, if necessary, carry out an error analysis.

The latest generation of ASTRO IP/QAM modulators can not only precisely monitor itself, but also all received (external) input signals at the same time. ASTRO IP/QAM modulators enable powerful, seamless monitoring of the internal and external signals and allow errors and their causes to be pinpointed precisely.

How does the integrated monitoring work?



Each U159-X module has an internal, central real-time transport stream analyzer (TS analyzer). Measurement probes for each input and output signal of the ASTRO IP/QAM modulators feed this with the transport streams to be monitored. The input signals are first „unpacked“ (decapsulated) from the IP data stream into an MPEG-2 transport stream. All output signals are converted into the MPEG-2 transport stream using a QAM demodulator. With the help of its onboard QAM demodulator, the ASTRO IP/QAM modulator in the U159-X can not only record the quality of its output transport streams, but also other quality parameters (e.g. SNR) of its self-generated QAM output signal. Errors and deviations in the MPEG-2 transport streams and in the QAM signal are clearly displayed with regard to the time of occurrence and the error pattern and are also saved in a data container. In this way, you can evaluate both the current signal quality and the signal quality for previous times.

Overview odf all input and output measurement probes

Under menu item „Monitoring“ the number of conconfigured measurement probes and their status are displayed.

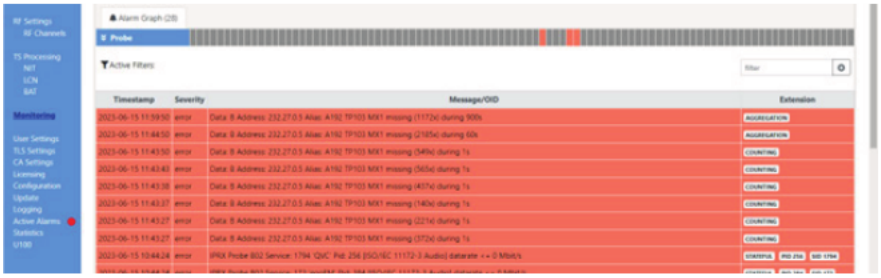
Click on the thumbnail of a measurement sample to view the status of the last 24 hours individually.

Status display of measurement probes

Points in time at which an error was detected are highlighted in color in the respective timeline.

Alarm tabe for each measurement probe

An alarm table provides more in-depth information as to which service was or is specifically affected by which error. An alarm table assigned to it can be called up for each measurement sample.



Example: Alarm table for the input sample (multicast 232.27.0.5)

Internal transport stream analyzer

The internal transport stream analyzer monitors and displays a large number of parameters. The following parameters are essentially monitored: CC error, service interruption, data rate, PAT, PMT, missing service components (e.g. PIDs), SNR , bit error, output level.

The components of a transport stream are clearly displayed in a tree structure, including the determined data rates and PIDs.

You can freely define the input and output signals to be included in the monitoring. In addition, the ASTRO IP/QAM modulator in the U159-X offers the option of feeding an MPEG-2 transport stream back into the network using IP multicast. In this way, error patterns reported „live“ at another location can be traced and, if necessary, further measurements can be carried out on the returned transport stream at this location.

VLAN Support

ASTRO IP/QAM modulators already support so-called tagged VLANs (Virtual Local Area Networks) on the data interfaces. This means that several sub-networks can be controlled on one physical port. The VLAN support includes both the subscription to the selected multicast streams via IGMP/MLD and the extraction of the MPEG transport streams from the received IP streams.

M7

The feature VLAN support is e.g. a prerequisite and requirement for the connection and forwarding of the IP signals that will be provided in future by the M7 platform for TV distribution.

Application examples

4 x U 159-X

- up to 48 QAM channels
- including link, source and N+1 device redundancy
- redundant signal sources under surveillance
- redundant power supplies

3 x U 159-X

- up to 64 QAM channels
- including link **OR** source & N+1 device redundancy
- redundant signal sources under surveillance
- redundant power supplies

2 x U 159-X

- up to 64 QAM channels
- including 1+1 device redundancy
- redundant power supplies

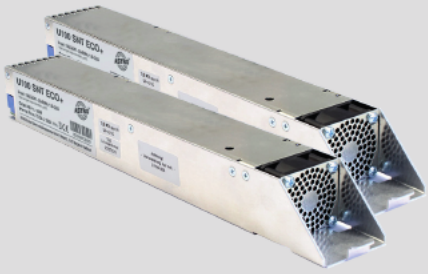
U 259-O

- up to 64 QAM channels
- 19 inch module with management interfaces, data ports and RF Output, test point and SFP slots integrated into the front panel
- designed with extended temperature range for operation in street cabinets
- optical output SC/APC

Miscellaneous features

Front display to show the operational status like IP configuration, error messages, firmware version and more…

Redundant power supply by using two U 100-SNT ECO PSU per U 100-230 base unit. Optional 48 V DC base unit available. For 48 V DC operation additional power supplies are not needed.



Overall controller module for time controlled updates, replacement switching and centralized head end management

Specifications

Type		U 159	U 159-X	U 259-O
Order Number		380 159	380 305	380 278
EAN-Code		4026187193270	4026187270711	4026187199012
Base unit		separate module, up to 3 in U 100-230 or U 100-48	separate module, up to 3 in U 100-230 or U 100-48	1 RU, outdoor version for cabinets
Network interfaces (passive routing to U 1xx)				
Management		2 x 1000 Base-T Ethernet (RJ 45)		
Data		4 x SFP (1000 Base-X or SGMII)		
Input Bitrate per Data Port	[Mbit/s]	1000/1000/900/750 @1/2/3/4 Ports		
Protocol		Ethernet, ARP, IPv4, IPv6, UDP, RTP, TCP, HTTP(S), SNTP, SNMP v2c/v3, Syslog, IGMP v2/v3, MLD v1/v2		
Serial		1x RJ 45, 115200 kbit/s, 8N1		
Transport Stream Processing				
TS Decapsulation		UDP, UDP/RTP, 1-7 packets, FEC (SMPTE 2022-1, -2)		
Packet Length	[Bytes]	188		
Data rate adjustment		☑		
PCR-Correction (< 500 ns acc. DVB)		☑		
NIT Handling		static, NIT from PID, dynamic		
Scrambling				
scrambling of transmitted QAM channels according CSA		-	☑	-
QAM-Modulator				
Modulation		16-, 32-, 64-, 128-, 256-QAM		
Signal processing		DVB EN 300 429, ITU J.83 Annex A/C		
Spectrum shape cos-roll-off	[%]	12, 13, 15, 18		
FEC		Reed-Solomon (204, 188) Code		
Symbol rate	[Msymb/s]	1 - 7,14		
Channel Bandwidth	[MHz]	1,12 - 8 (depends on symbol rate)		
Maximum number of channels		64		
Maximum bitrate per output channel	[Mbit/s]	52,64		
Phase error dynamic	[°]	0,3		
MER (Equalizer)	[dB]	≥ 44		
Shoulder attenuation	[dB]	> 56		
QAM probe with on-board decoder for output signal analysis		-	-	-
RF-Modulator				
Connectors		75 Ω, 2 x F-jack (1 x RF, 1 x Test point -20 dB)		1 x SC/APC, 1 x F-jack (Test point)
Frequency range	[MHz]	47 - 1006 (760 MHz effective bandwidth), digital modulation		
Frequency drift	[kHz]	< 10		
Output level	[dBµV]	114/111/108 @16/32/64 Channels		3 dBm @ 1550 nm, OMI 3,5-4 %
Intermodulation distance	[dB]	> 60		
Return loss	[dB]	> 14		
Spurious frequency distance	[dB]	> 60		
Intercarrier Signal-to-Noise ratio	[dB]	> 60		
Common data				
Current consumption at 48 VDC	[mA]	830	950	950
Power consumption	[W]	45	50	50
Input voltage	[V]	36 - 60 V DC	30-60 V DC (with U 100-48) or 230 V AC (with U 100-230)	
Dimensions		Plugin module for base unit, 1 RU, 19 inch		1 RU, 19 inch stand alone
Ambient temperature	[°C]	0...+45		

Made in Germany

The ASTRO IP head-end modules handle all output signals distributed in standard CATV networks: QAM, PAL, COFDM and FM. Based on the proven Direct Digital® system, all the signal converters provide outstanding parameters. For generating IP signals, different types of IP streamers are available. These are equipped with DVB-S2 or DVB-C/T2 frontends and offer high signal density. All head-end components from ASTRO are “Made in Germany”.

Solutions for IP and Optical Fibre Technology

We offer complete system solutions.
Just call us!

Our Service

Consulting

You have a special project and need additional knowhow? You are in need of a system upgrade, a special Head-end System Planning or Fibre Network Design? Just contact us. Together we will discuss your needs, clarify questions, scope and point out special features.

Planning

According to your needs we will start a professional project planning and setup of an individual system landscape, a complete broadcasting network solution from head-end to subscriber. IP Master Head-end, Sub Head-end or Optical Access Network? We will take care with our planning department.

Support

Make yourself free from all technical operations. We take over pre-configuration services until the final installation of the complete Head-end and Optical Network environment: Ready to start your operations. Our team of specialists will take over 24/7 support if requested by you. Our Maintenance and Repair Services cover a wide range of products.

Training

Head-end systems and Fibre Networks require special knowhow in engineering, configuration and maintenance. We offer individual trainings for your team to be capable in managing all aspects of uptodate IP and Optical transmission technology.

- Longtime experience and security
- Leading expert in the SAT & Cable branch
- Development of products and services
- Strong regional partner
- Project planning and support from A-Z
- Market leader for head-ends in Germany
- Individual support in technology and sales
- Guarantor for more sales and margin
- Training and know-how transfer
- Patents, licenses, CE, security

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