

FOR CABLE TV, IPTV AND OTT SOLUTIONS



## TANGRAM

### The High Performance Headend for Gateway and Edge Applications



#### Solutions with TANGRAM



##### CHANNEL PROCESSING

Headends for residential, regional and national networks.



##### RF OVERLAY

Solutions for video services in GPON and active Ethernet networks.



##### HOUSING INDUSTRY

Headends for housing complexes, hotels and hospitals.



##### HFC

From the Headend to the wall-outlet: Everything for the cable network.

# TANGRAM

## Maximum Performance, Minimum Footprint

The TANGRAM platform is highly customizable and offers advanced DVB stream processing in a small footprint 1 RU chassis concept. The TANGRAM chassis can be equipped with 6+1 modules and comes with an integrated GigE Switch.

The integrated switch operates as a configurable switching unit for audio/video streaming via Gigabit Ethernet and manages the modules for the redundancy mechanism. One port of the GT11 provides the management interface. The six rear loaded modules have different functionalities, and can perform all necessary signal processing functions.

The WISI TANGRAM video platform is a high-density digital TV head-end for contribution of digital TV via IP networks and end-to-end IPTV solutions such as video-on-demand, connected TV and OTT (Over The Top) or Web TV. The TANGRAM platform can be used in a central or distributed headend architecture and provides the following processing functions in a central location:

- DVB-IP Gateway for DVB-C/S/S2/T/T2, ATSC and ISDB-T Reception
- Descrambling and Scrambling
- Remultiplexing and PSI/SI Processing
- Digital and analog Edge Modulation
- QAM, PAL, NTSC, SECAM, FM, COFDM and ISDB-T
- T2-MI de-encapsulation and PLP management

In decentralized architecture with regional hubs, the modulation is done at the hub sites. The aggregated digital TV streams are transported via an IP network (Backbone) to the hub site and are terminated on the Edge equipment (Edge QAM, Edge PAL, Edge FM, Edge COFDM or Edge ISDB-T) for modulation and transmission in the HFC networks.

The TANGRAM chassis can optionally be equipped with two load sharing redundant power supplies (DC or AC) and contains high performance monitored fans for cooling. All modules, fans and power supplies are hot swappable.

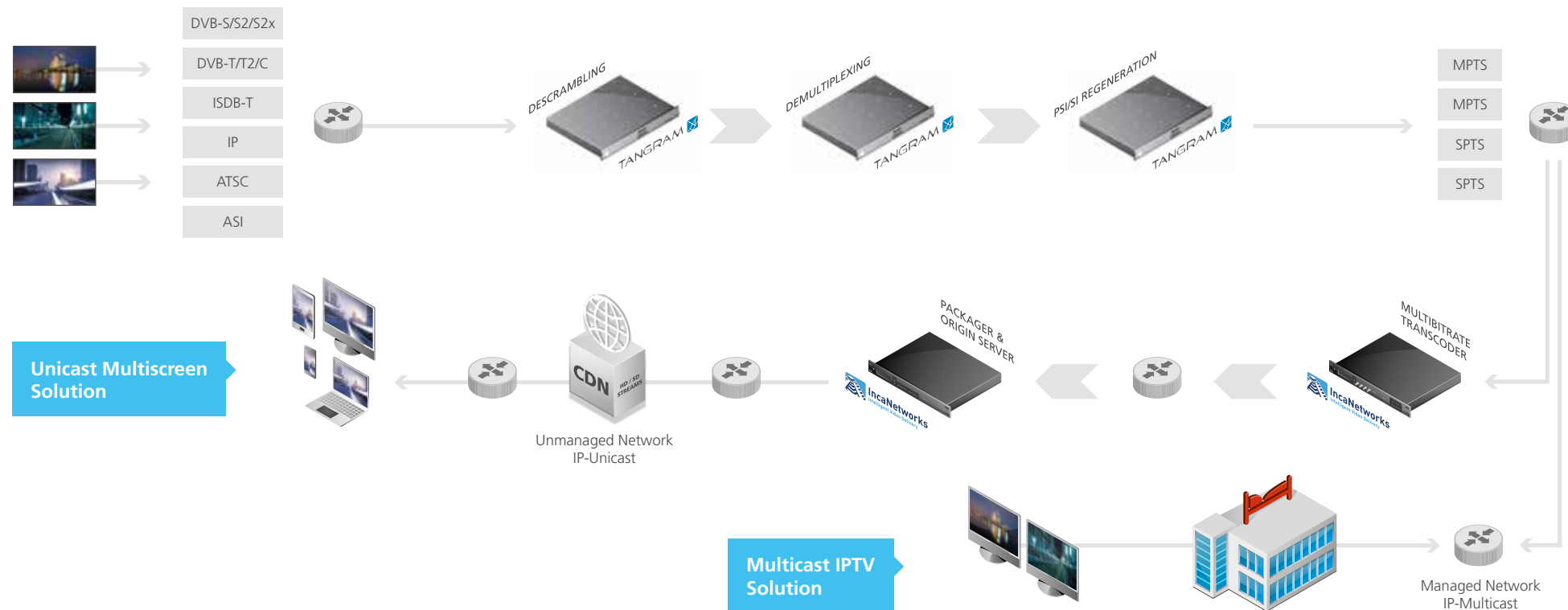
### Advantages at a glance

- ✓ **Excellent cost-performance by highest density and low power consumption**
- ✓ **High level of reliability by full redundancy concept and hot swappable fan bay & PSUs**
- ✓ **Maximum flexibility and simplicity by modular architecture and easy to operate via web UI**
- ✓ **Great variety for building your future-proof TV network. IP, DVB-C, ASI, DVB-T/T2/S/S2, DVB-T2-MI, PAL, NTSC, SECAM, FM, ISDB-T, ATSC**

# TANGRAM Applications

## DVB - IP Gateway

The TANGRAM receivers provide a best-of-class gateway platform for Cable and IPTV operators. The receivers enable flexible receiving of streams and IP encapsulation for different formats of DVB-S/S2/S2x, DVB-T/T2, DVB-C, DVB-ASI, ISDB-T, ATSC, and T2-MI de-encapsulation. The gateway solution is the basis for providing the digital TV content for IP distribution and for all kinds of different applications, like multiscreen transcoding or edge modulation.



Acquisition



Descrambling



Demultiplexing



PSI/SI Regeneration

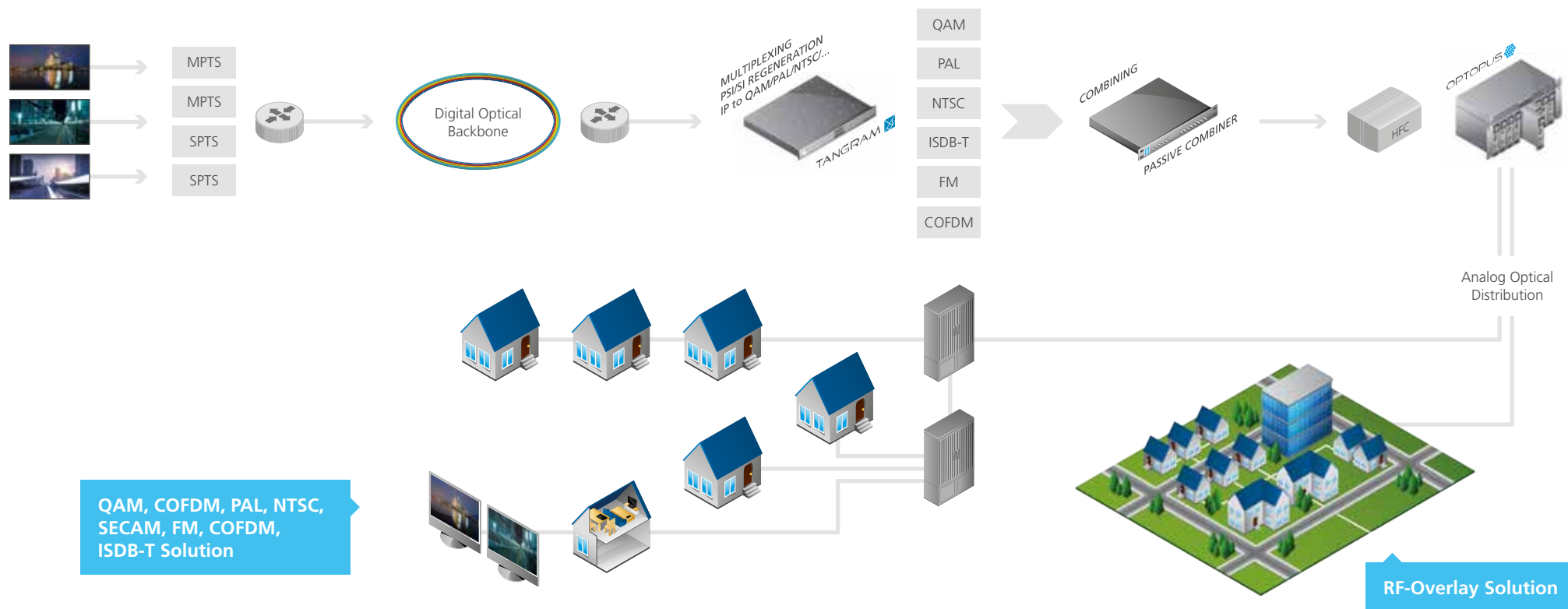


IP Transmission

# TANGRAM Applications

IP to Edge QAM/COFDM/ISDB-T/PAL/NTSC/SECAM/FM

The TANGRAM edge solutions open the doors to establishing and operating analog and digital cable TV services. It supports a full range of different analog and digital standards like PAL, NTSC, SECAM, QAM, COFDM and ISDB-T. The solution with TANGRAM and OPTOPUS offers high flexibility for building a cable and optical headend, as all functions are performed by individual units that can be added to the system when needed.



# TANGRAM Product Benefits

## HIGH RELIABILITY

The base unit provides a carrier grade chassis and supports a fully redundant concept (1+1, n+1). The intelligent redundant concept guarantees a high system availability and reduces maintenance outages.



### CHASSIS

- Redundant power supply
- Hot pluggable fan bay
- Gigabit Ethernet port redundancy

### MODULE

- N+1, 1+1 redundancy
- Input transport stream redundancy



## MAXIMUM FLEXIBILITY

The modular concept of the TANGRAM platform allows combining the GT modules for your application. You can mix different applications in a single system.



### INPUTS

- IP
- ASI
- DVB-S/S2/S2x
- DVB-T/T2
- DVB-C
- ISDB-T
- ATSC

### OUTPUTS

- QAM
- COFDM
- FM
- ISDB-T
- PAL
- NTSC
- SECAM
- ASI
- IP

### PROCESSING

- Multiplexing
- Demultiplexing
- Descrambling
- Scrambling
- T2-MI de-encapsulation
- EPG regeneration
- PSI/SI regeneration

## EXCELLENT COST PERFORMANCE

The high density Edge modules, the DVB-Gateway with multi tuner support and low power consumption reduces the costs per channel or transponder reception.



## SIMPLICITY

TANGRAM is optimized for easy mounting and initial operation. The web UI of TANGRAM is structured to simplify configuration and management, and supports you step by step in getting a running system.

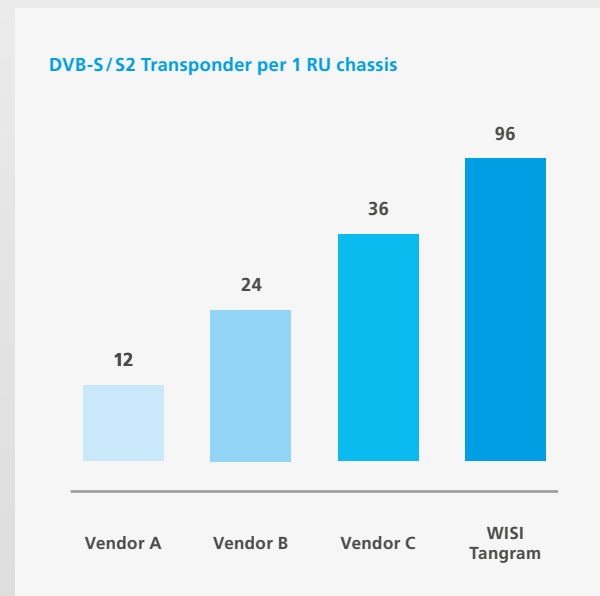


# TANGRAM Facts & Figures

## High Density System

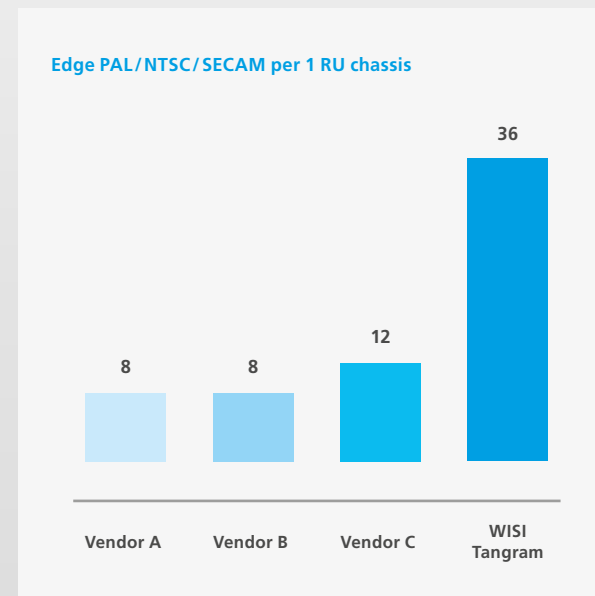
### Receiving up to 100 % more DVB-S/S2 transponder

The DVB – Gateway needs less space for deployments compared to other products. This reduces the cost of deployment, sparing and rack space lease.



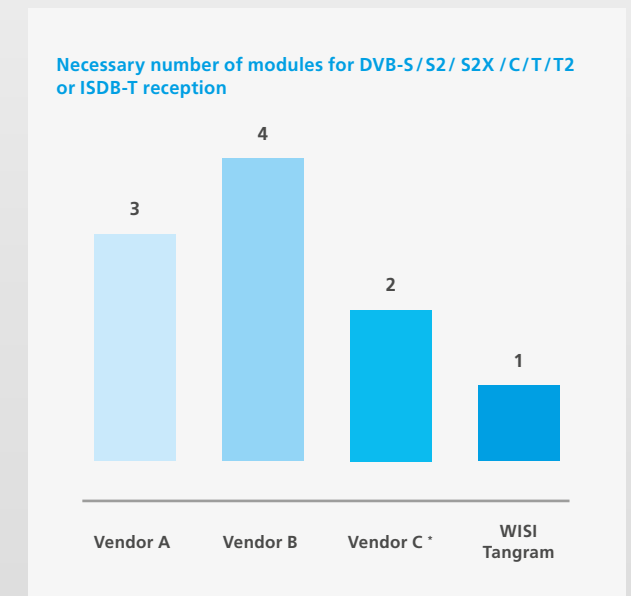
### Tripling the number of generated PAL/NTSC/SECAM channels

The high density edge module allows you to generate up to 36 analog TV channels with different standards. This reduces the costs per channel, saving the cost of energy and air conditioning.



### Less space necessary for the multi-standard reception

The DVB – Gateway supports the most popular standards for satellite and terrestrial reception in one module. This provides a future-proof and flexible gateway solution.

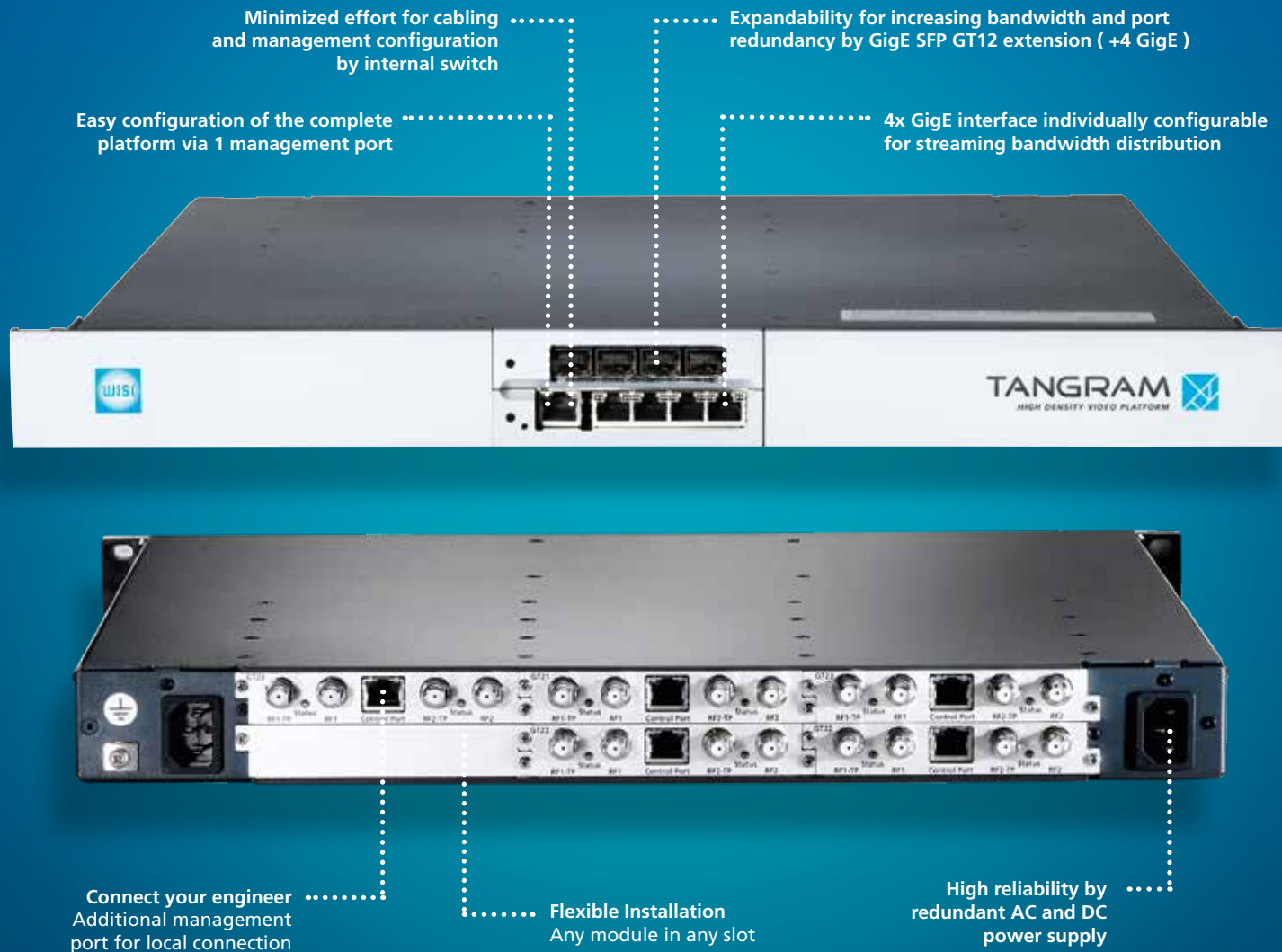


\* No ISDB-T Support



# TANGRAM Chassis Overview

The TANGRAM chassis is a 1 RU chassis which can fit up to 6 modules on the backside and 1 module on the front panel. It comes with an embedded switch on the backplane (GT01W, GT11) and a hot swappable fan tray. The GT01W is a carrier grade chassis and supports a fully redundant concept (1+1, n+1).





# TANGRAM Technical Specifications

## DVB-T / T2 Receivers (GT31W)

Impedance	75 $\Omega$
Input frequency range	43-1002 MHz
Input level range	39 to 79 dB $\mu$ V
DVB compliance	DVB-T (EN300744) DVB-T2 (EN302755)
Return loss	>18 dB @ 47 MHz >12 dB @ 862 MHz
Bandwidth (DVB-T) (DVB-T2)	6/7/8 MHz 1.7/5/6/7/8 MHz and ext. bandwidth
FEC inner code	Conv., K=7, G= 1/2, 2/3, 3/4, 4/5, 5/6, 7/8
COFDM spectral	2k and 8k FFT
Guard interval	1/32, 1/16, 1/8, 1/4

## DVB-S / S2 Receivers (GT31W)

Impedance	75 $\Omega$
Input frequency range	925-2150 MHz
Input level range	45 to 90 dB $\mu$ V
DVB compliance	DVB-S (EN300421) DVB-S2 (EN302307)
Return loss	>12 dB
DiSEqC	DiSEqC 1.0. Supporting control of up to 4 satellite sources
FEC inner code	LDCP (1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10)
LNB voltage / power	13/18 V, 0,4A max.

## DVB-C Receivers (GT31W)

Impedance	75 $\Omega$
Input frequency range	43-1002 MHz
Input level range	49 to 90 dB $\mu$ V (QAM256)
Compliance	DVB-C EN300429, ITU J.38 Annex A,B,C
Return loss	>18 dB @ 47 MHz >12 dB @ 862 MHz
QAM modulation scheme	16-, 32-, 64-, 128-, 256-QAM
DVB-C symbol rate	1 to 7.2 MBaud

## VSF –AM PAL/SECAM/NTSC Modulation (GT21W)

Standards	PAL B/G, D/K, L,M, N SECAM D/K, B/G, L NTSC
Sound	Mono, Stereo, Dual NICAM, A2
Modulation video	VSF AM, neg. or pos.
Modulation audio	Audio FM or AM
Output frequency	45-862 MHz
Output level	117 dB $\mu$ V (1 ch) 113 dB $\mu$ V (2 ch) 111 dB $\mu$ V (3 ch)
Video S/N (weighted)	1 channel typ. 64 dB

## DVB-C QAM Modulation (GT23W)

QAM mode	16, 32, 64, 128 and 256 QAM
Symbol rate	4.45 - 7.0 MBaud/s
MER (at RF out)	> 45 dB, typ. 46 dB
QAM output frequency	43-1002 MHz
Output level	119 dB $\mu$ V (1 ch) 115 dB $\mu$ V (2 ch) 113 dB $\mu$ V (3 ch) 111 dB $\mu$ V (4 ch)
Compliance	DVB-C EN300429, ITU J.38 Annex A,B,C

## CI Multidecryption (GT42W)

Number of CI slots	4 CI slots
Supported bit rates	55/66/72 Mbit/s
DVB Compliance	EN 50221

## ASI input/output (GT32W)

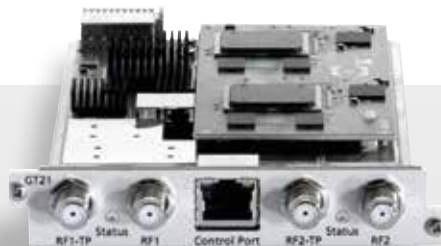
Impedance	75 $\Omega$
Frequency range	< 270 MHz
Return loss	> 17 dB (27-270 MHz)
Compliance	EN 50083-9:2002
Packet size Input   Output	188 byte and 204 byte   188 byte
PCR restamping	Yes
Input/Output max. payload bit rate	Typical 200 Mbit/s

# TANGRAM Edge Modules

The TANGRAM modules are the pieces of the puzzle that you combine to create your professional video headend solution.

## GT21W

Edge PAL / NTSC / SECAM



### Features

- High quality IP to analog PAL/SECAM/NTSC modulation
- Up to 6 analog channels on 2 RF outputs\*
- Outstanding signal parameters by direct digital modulation
- HD to SD downscaling functionality
- MPEG-2 H.262 and MPEG-4 H.264 decoding (SD & HD)
- For measurement/monitoring test ports of the output signal
- Temperature and output level monitoring
- RTP/IP input streaming with FEC error correction

## GT22C

Edge FM



### Features

- High quality IP to analog FM modulation
- Up to 8 FM channels on 1 RF output
- Advanced MPEG decoding
- Outstanding signal parameters by direct digital modulation
- High density 48 FM channels in 1 RU
- RTP/IP input streaming with FEC error correction
- RDS extraction and insertion
- For measurement/monitoring test ports of the output signal

## GT23W

Edge QAM



### Features

- High quality IP to QAM modulation
- Up to 12 QAM channels on 2 RF outputs\*
- High density 72 QAM channels in 1 RU
- For measurement/monitoring test ports of the output signal
- DVB CSA Simulcrypt scrambling
- RTP/IP input streaming with FEC error correction
- Advanced DVB transport stream processing
- QAM channels individually switch on/off

\*Up to 6 for SD or up to 3 HD to SD and 3 SD

\*Up to 12 DVB-C Annex A, up to 8 Annex C and up to 6 Annex B with SW >=3.0

## TANGRAM Chassis

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### GT01W0230



19" 1 RU chassis with backplane, 1 power supply (230 VAC), fan tray and integrated GigE switch (GT11)

### GT01W0110



19" 1 RU chassis with backplane, 1 power supply (110 VAC), fan tray and integrated GigE switch (GT11)

### GT01W0048



19" 1 RU chassis with backplane, 1 power supply (48 VDC), fan tray and integrated GigE switch (GT11)

## TANGRAM Power Supplies

### GT55W0230



Redundant PSU 230V AC for GT01W

### GT55W0110



Redundant PSU 110V AC for GT01W

### GT55W0048



Redundant PSU 48V DC for GT01W

### GT24W

Edge COFDM



### GT26

Edge ISDB-T



### GT12W

SFP Switch Extension Board



#### Features

- High quality IP to COFDM modulation
- Up to 8 COFDM channels on 2 RF outputs\*
- Outstanding signal parameters by direct digital modulation
- RTP/IP input streaming with FEC error correction
- High density 48 COFDM channels in 1 RU
- Advanced DVB transport stream processing
- For measurement/monitoring test ports of the output signal
- DVB CSA Simulcrypt scrambling

#### Features

- High quality IP to ISDB-T modulation
- Up to 4 ISDB-T channels on 2 RF outputs
- ARIB/DVB transport stream processing
- RTP/IP input streaming with FEC error correction
- Outstanding signal parameters by direct digital modulation
- Output detection for alarming and redundancy switching
- For measurement/monitoring test ports of the output signal
- Up to 24 ISDB-T channels in 1 RU

#### Features

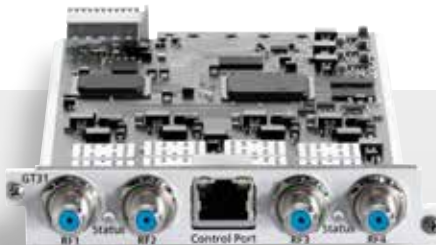
- 4x SFP slots for optical or electrical access
- High flexibility for bandwidth extension
- Port and service redundancy for external connection (main/backup)
- Support of standard SFPs
- Bandwidth Port Monitoring

\*Up to 8 (2k Mode) or up to 4 (2k/8 Mode)

# TANGRAM Input & Processing Modules

## GT31W

DVB-Gateway



### Features

- Multi transport stream reception for DVB signals
- 4x DVB-S/S2/S2x/C/T/T2 and ISDB-T RF inputs
- Advanced DVB transport stream processing
- RTP/IP FEC output stream protection
- High density reception 24 transponder in 1 RU
- Demultiplexing of MPEG-2/4 signals for SPTS transmission
- SPTS and MPTS streaming (CBR or VBR)
- UDP and RTP MPEG transport stream over IP protocol

## GT32W

ASI-IP in/out



### Features

- 4x ASI input or output, each BNC port configurable as input or output
- PID remapping and filtering
- RTP/IP input streaming with FEC error correction
- Advanced DVB transport stream processing
- Demultiplexing from MPTS to SPTS
- High density 24 ASI in or out in 1 RU
- Supports IP input and output streaming (CBR or VBR)
- Supports 188 byte and 204 byte packet size

## GT33

8VSB - ATSC/QAM J.83 B IP Gateway



### Features

- Multi transport stream reception for ATSC signals
- 8x 8VSB-ATSC/QAM J.83 B Tuner with 4 RF inputs
- RTP/ IP FEC output stream protection
- High density reception 48 transponder in 1 RU
- Demultiplex MPEG-2/MPEG-4 signals for SPTS transmission
- SPTS and MPTS streaming (CBR or VBR)
- UDP and RTP MPEG transport stream over IP protocol

# TANGRAM Input & Processing Modules

## GT34

8x/16x DVB-S/S2 - IP Gateway



### Features

- DVB-S/S2 – IP gateway for IPTV, CATV and multiscreen solutions
- Reception of up to 16x DVB-S/S2 satellite transponders via 4 RF-inputs
- For saving cabling costs integrated SAT multiswitch
- Professional DVB transport stream processing
- SPTS and MPTS streaming (CBR or VBR)
- UDP and RTP MPEG transport stream over IP protocol
- High-density reception of 96 transponders in 1 RU

## GT41W

IP Processing



### Features

- High density MPTS ↔ SPTS IP Gateway
- Scrambling for IPTV out (CSA, AES, Pro:Idiom, Samsung LYNK)
- DVB CSA Simulcrypt scrambling
- Advanced DVB transport stream processing
- Supports MPEG-2 H.262 and MPEG-4 H.264 scrambling (SD & HD)
- SPTS/MPTS streaming and receptions (CBR or VBR)
- Verimatrix bulk encryption
- Dedicated Ethernet interface for CAS connection

## GT42W

Descrambler



### Features

- 4x Common Interface (DVB-CI) slots per module
- CAM watchdog - auto reset on descrambling failures
- Support for all major CA systems and CAMs
- Advanced DVB transport stream processing
- SPTS and MPTS streaming (CBR or VBR)
- Demultiplexing MPEG-2/4 signals for SPTS transmission
- High density descrambling 24 CA modules per 1RU chassis
- FEC output support – IP error protection

# TANGRAM Software Options

Software options are licence files that enable the defined functionalities. The software options can be bought at the same time as the hardware, or as a separate order. You can add software options to an existing TANGRAM at any time, when you want more functionality. More technical info can be found at [katalog.wisi.de](http://katalog.wisi.de)

## Software Update Agreement GTM1/GTM3

The TANGRAM product platform is continuously evolved and developed with new or extended functionalities. To benefit from the development, you can upload new firmware versions to your existing installations. To be allowed to upgrade to a new firmware version, you must have a gapless and valid Software Update Agreement. All TANGRAMs get a one-year SUA from the date of registration at WISI Connect.

## Scrambling GTSCR, GTSCRX, GTAES, GTLYNK, GTPISCR8

The type of content encryption in TANGRAM is enabled by the software options GTSCR (CSA Simulcrypt), GTSCRX (extension CSA Simulcrypt), GTASE/X (AES-128), GTLYNK/X (Samsung LYNK), or GTPISCR8/16/24 (Pro:Idiom). The scrambling GTPISCR8/16/24 software option allows you to use the TANGRAM as a scrambler for encryption of the output services, by connecting to a Conditional Access Server (CAS) via the IP interface or adding manually a key.

## Dolby Decoding GTDOL

The TANGRAM Dolby decoding for analog output is enabled by the software option GTDOL. The Dolby decoding allows reception of Dolby audio sound and decoding to support the different audio output formats for analog (PAL and SECAM) modulation. The GTDOL software option requires a Dolby enabled TANGRAM hardware.

## Descrambling GTBISS, GTVMX, GTVMXX

The descrambling of BISS encrypted content, delivered by satellite or IP, will be enabled by the GTBISS software option. The GTVMX and GTVMXX (extension of the number of services) software option enables the bulk decryption of encrypted Veri-matrix content.

## IP Input Redundancy GTRED

IP input redundancy in the TANGRAM is enabled by the software options GTRED. The IP input redundancy handles switching between sources carrying identical information, e.g. dual sources, for securing operation even in cases where one source fails completely.

## Remultiplexing & PSI/SI GTMUX, GTPSIS, GTSYMUX

Remultiplexing and PSI/SI handling in the TANGRAM platform and in a system of TANGRAMs are enabled by the software options GTMUX (remultiplexing in a single TANGRAM), GTPSIS (enabling PSI/SI sharing between TANGRAMs), and GTSYMUX (remultiplexing in a system of TANGRAMs).

## Extension for IP in- and outputs GTSTRX

With the extension GTSTRX software option the number of IP in- and outputs can be increased up to 128. GTSTRX is available for the GT3x and GT4x modules.

## IP Forward Error Correction GT FEC

The TANGRAM GT FEC software option provides an advanced error correction and error protection for IP streams. For IP SPTS or MPTS streaming reception, FEC is useful to correct errors in the packets and improving the quality of service. FEC for output streaming with error protection enables TV operators to deliver high-quality error resistant IP streams from the headend.

## T2-MI De-Encapsulation GTT2MIDE, GTDT2MIDE, GTQT2MIPL

The TANGRAM T2-MI de-encapsulation is enabled by the software options GTT2MIDE (1 de-encapsulator with up to 2 PLPs), GTDT2MIDE (2 de-encapsulator with up to 4 PLPs) and GTQT2MIPL (4 additional PLPs). Complying with the T2-MI EN TS 102 773, the TANGRAM T2-MI de-encapsulator gives professional T2-MI inputs for all sizes of cable networks.

## N+1 Redundancy GTNRED

The N+1 module redundancy for GT01Wx is enabled by the software option GTNRED. The N+1 redundancy for GT01Wx provides the functionality to set up redundancy groups, and assigning TANGRAM modules as "master" or "reserve" or "none" for a group. The "reserve" TANGRAM in a redundancy group is kept "offline" until it needs to be used due to a failure in an operational TANGRAM.

# WISI Tools

We provide several different tools to help you make the most out of your WISI products. The tools give you easy access to support such as forums, FAQ's and help with configuring your installations. They are available without any extra fee for all TANGRAM customers.

configurator.wisi.de



## WISI Configurator Selecting & Ordering Software

The WISI Configurator is an online tool to help you select and order the optimal software options for your particular installation.

Once an order has been processed, the entitlement file containing the licences for the software options will be available for download at the WISI Connect portal.

In order to gain access to the WISI Configurator you need to register as a customer. You can do this at the WISI Configurator website.

wisiconnect.tv



## WISI Connect Registration & Information

The WISI Connect portal is a repository for information about your TANGRAMs. All your registered products will be listed, and you can add textual information such as installation site or the function for each TANGRAM. Product documentation, release notes and all released firmware versions are available for download from the portal. The FAQ and Forum gives additional help, and allows you to share questions and information with other TANGRAM users.

At the portal you can also download the entitlement file enabling your purchased software options.

Your TANGRAM IP



## WISI Control Control & Management

The TANGRAM is configured and managed via WISI Control, the web UI. Each TANGRAM contains an embedded web server, and no proprietary control software is needed. To connect to the UI of a TANGRAM, simply start a browser on your computer and type the IP address of the TANGRAM in the address field.

The web UI of TANGRAM is structured to simplify configuration and management. To unlock your previously purchased software options, upload the entitlement file that you downloaded from the WISI Connect portal and make your desired settings.



**Any Video from  
Any Source to  
Any Device**



**WISI Communications GmbH & Co. KG**  
P.O. Box 1220  
75219 Niefern-Oeschelbronn, Germany

Phone: +49 72 33-66-2 80  
Fax: +49 72 33-66-3 50  
E-mail: [export@wisi.de](mailto:export@wisi.de)

