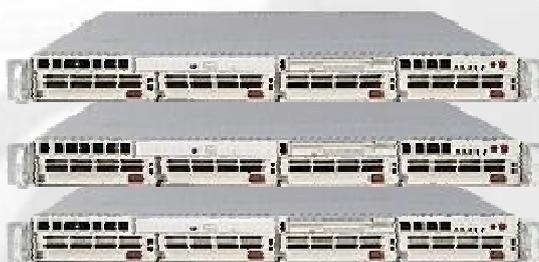# IDM100 Integrated Digital TV Monitoring

ITNM Systems

IDM100

**● Complete monitoring of the quality of service ● Several user levels ●
● Central and local application ● Control on distance ●
● Monitoring of all relevant DVB-parameters ●
● DVB table check ● PCR- en PTS-relationship ●
● SNMP ● ASI and GbE ●**

ITNM Systems IDM100
Integrated Digital TV Monitoring

Monitoring of digital TV systems

Today's operator is acting in a competitive market. For that reason, permanent quality guarding and control becomes of vital importance. Digital television offers unmistakable advantages, but also has vulnerable properties. Errors in the data stream and in the distribution chain can result in annoying disturbances in sound and picture quality and has a fatal effect on the image quality and customer's QoE. The more important it is to monitor stability and reliability continuously, so that it is always possible to diagnose problems instantly and before the impact of disturbances will escalate seriously.
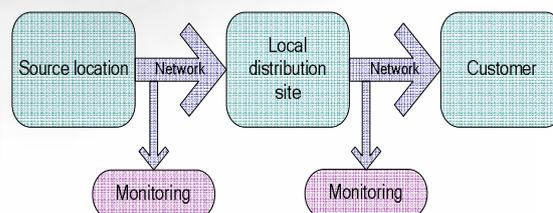
IDM100 Integrated Digital TV Monitoring

ITNM Systems offers a powerful, advanced, cost-effective and above all pragmatical monitoring system for analysis, guarding and testing of digital TV networks. The IDM100 Integrated Digital TV Monitoring is a complete and user friendly monitoring system for digital radio and TV. It is extremely flexible to use by means of standard web browser access, which means that

no special software is required on the workstations. Monitoring in accordance with the final result on the customer's set-top box prevents unnecessary reports. Integration of audiovisual options makes it possible to access the system on distance by service personnel working in shift duty by means of a standard Internet connection, apart from the availability of the television signal itself.

Scalable network design

The IDM100 series are applicable in most types of digital TV distribution systems, like DVB-C and IPTV. Extension of the programme capacity is no problem at all by means of scalable modular design. The system can be used centrally as well as locally with clear insight over the whole distribution chain as a result.

Monitoring locations IDM100

IDM100

IDM100
Product description

The Solution

The IDM100 series Integrated Digital TV Monitoring is a powerful, complete and user-friendly monitoring system for digital radio and television, applicable for DVB and IPTV networks.

Versatile

Errors in the transport streams are reported according to priority, so that the cause of the problem is revealed more quickly. Several colours reflect the status of network at a single glance. This gives employees of the network control centre direct access to the system without thorough knowledge of digital TV.

SNMP support

A SNMP-generator is able to pass on alarm messages to an overall management system for an optimum overview in the status of the digital platform, within the total package of services. The systems supports XML-RPC.

Design

The systems consists of five different components:

- Monitor
- Analyzer
- Zapper
- Local Zapper
- Workstation(s)

Optionally a database server can be added to the system for extended processing of status and error messages. A minimum sized configuration consists of one Monitor and one Analyzer.

Scalable Design

There can be more units of every component added to the system. In the description of each component more information is given about the specific task and configuration.

Audiovisual options

Efficient audiovisual presentation gives insight in the status of the services in a similar way how the customer experiences the end result. A stationary picture and quiet sound in a programme is detected and reported so that action can be undertaken still before the customer has to report the same problem to the call centre. Samples of all channels are taken sequentially of which the result is stored as a snap-shot, by way it can be made visible and audible afterwards for further analysis. Audiovisual checking is also applicable in systems using scrambling like Irdeto 2 or Nagravision.

Proved functionality

The history of the IDM100 goes back to the Network Control Centre of Mediakabel, the company that served most of the cable operators when digital tv was first launched in the Netherlands.

Since than the IDM100 has been implemented in locations at Ziggo, Caiway, Delta, UPC, SBS Broadcasting and Chellomedia.

Options

Adaptation according to customer demands is what ITNM is reknowned for.

IDM100

IDM100
Product description

Monitor

The Monitor's primary task is continuously gathering of raw information out of the data in the digital transport streams. All packets, sections, tables, time stamps and scrambling status indicators are counted and categorized.
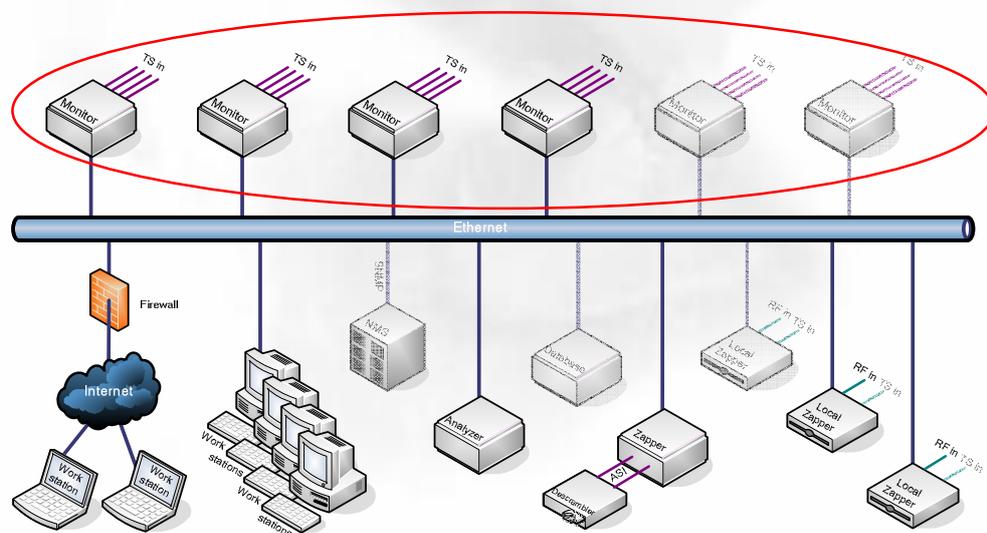
Report

Every table and PID (Packet IDentifier) is reported according to its specific type of information. The result of that is sent to the Analyzer with an interval of one second by means of an Ethernet connection. Whenever a new table is detected in the transport stream, the Monitor will identify and report it as well.

Inputs

Normally the Monitor is equipped with Gigabit Ethernet but ASI or DVB-C inputs are also possible. The solution is fully scalable to any number of transport streams at any bandwith.

Capacity

The total network capacity is de divided over one or more Monitors and can always be increased. The system is normally installed at the location where digital radio en television signals are centrally processed.

Network design IDM100: Monitors

IDM100

IDM100
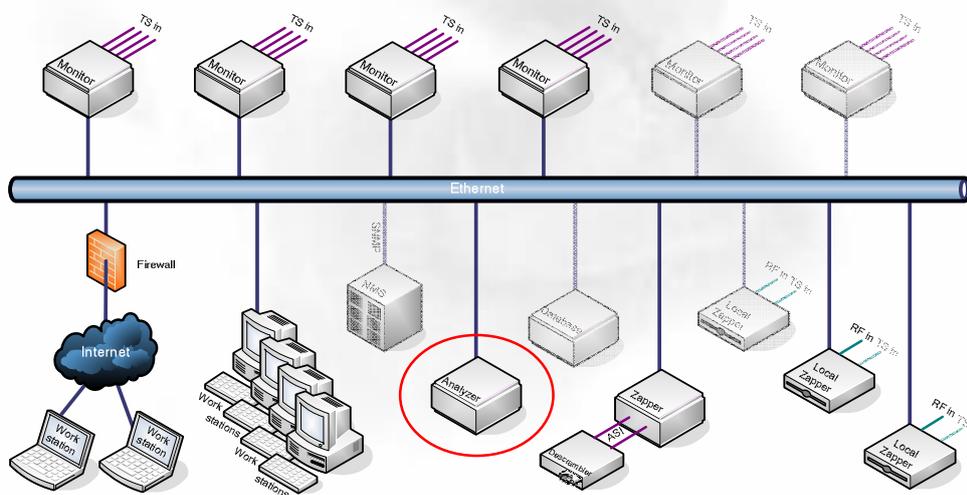## Product description

Analyzer

The Analyzer is the heart of the system. It analyzes the reports sent by the Monitor. The investigation of the data is done in a dual way, based on deviation of the standards and according to the expected information.

Flexible limits

Data is checked according to international DVB guidelines, but it's always possible for the network controller to apply flexible limits, in this way making operations much more pragmatical. An observed difference to what should be expected is reported to the user, related proportionally to the limits. At the same time, a priority is granted according to the preference of the user.

Logical display

An event is displayed on a Workstation in several different colours according to the gravity of the problem and the effect on the consumer's decoder. In one single glance the status of the whole network is clearly displayed giving network control operators with a broad range of skills direct access to the condition of the system. Priorities are all user defined.

Network design IDM100: Analyzer

IDM100

IDM100
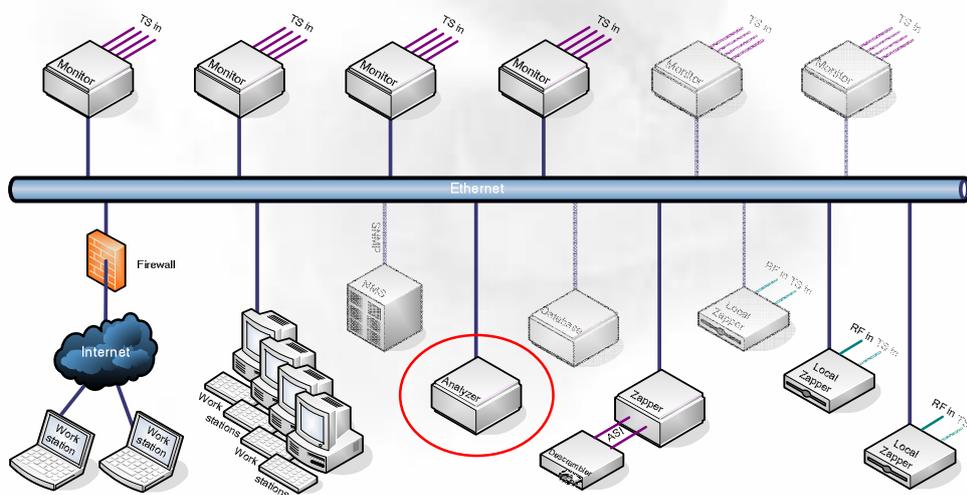# Product description

Active control

By comparison of the composition of the transport streams with the configuration stored in memory, deviations are reported. Whenever - for example – teletext or subtitling is missing in a channel that should be present according to the set-up or if a service by mistake is distributed without scrambling, these events will be noticed.

Standardised Workstations

The Analyzer also generates the user interface in easy to use HTML page lay-out. Workstations have access to the Analyzer by means of a standard web browser program. The SNMP generator inside of the Analyzer is able to forward messages to an overall network management system (NMS). An open XML-RPC interface is available to access all information available in the system. For Skyline DataMiner a driver is already available.

Extensive procession capacity

In normal configuration one Analyzer offers capacity for simultaneous processing for more than 48 transport streams and independent control for up to 20 Workstations. A capacity extension is always possible. By use of flexible communication properties the location of the Analyzer is not critical - every place inside the network's range can be used - although a combined connection together with the Monitors and Zapper will work most efficient.

Network design IDM100: Analyzer

IDM100

IDM100
Product description

Zapper

The functionality of the Zapper is sequentially checking of all radio and television channels. In about four seconds per service, audio and video properties are categorized by which video is locally saved as picture and audio is saved as a fragment.

Reporting

Problems with MPEG-decoding, scrambling, PTS-PCR relationship, still and black video and audio silence are reported to the Analyzer. The other way around, any user can access this stored audio and video result directly.

Flexible control on distance

The audiovisual properties make it possible to monitor the network from any place anywhere even without access to the signal and a working decoder. Just a personal computer or smartphone with Internet connection is required. All audiovisual samples can be recalled up to one month ago for further analysis.

Video recording

Besides the audiovisual snapshot archives, the system is equipped with a remote controllable streaming video recorder, giving direct visual and audible access to the service.

Descrambling

For descrambling of an encrypted signal, a professional external descrambler is used. This increases the overall stability independently of the applied scrambling system.

Extensive procession capacity

One Zapper has enough procession capacity for even 500 radio and television services and can be extended by adding another one. The Zapper is controlled by the Analyzer and is usually installed in the neighbourhood of the Monitor.
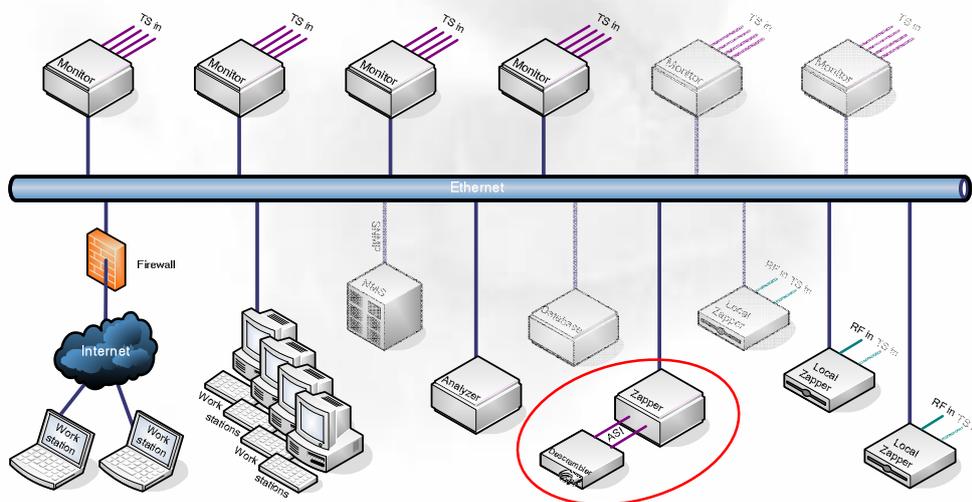
Network design IDM100: Zapper

IDM100

IDM100
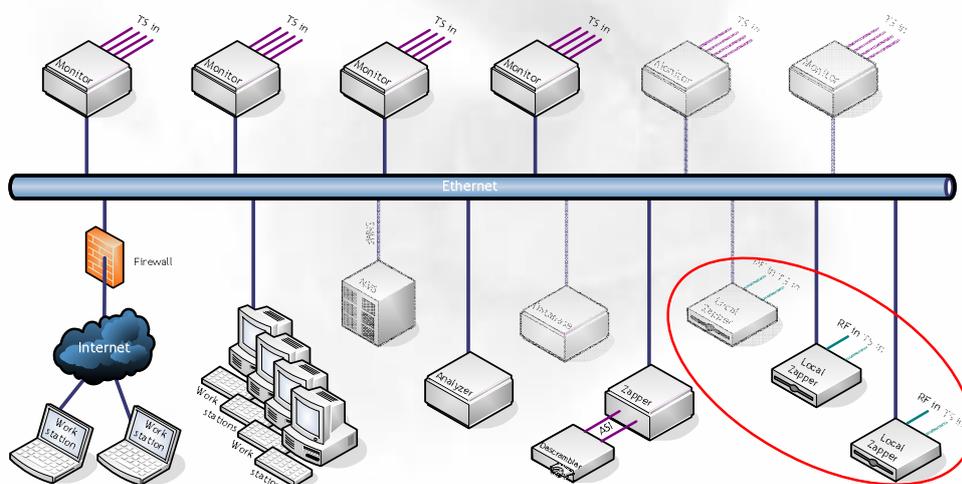# Product description

Local Zapper

The Local Zapper is designed to investigate the signal at the end of the distribution chain. It has multiple input options: Radio Frequency (RF) modulated DVB-C QAM signal and electrical (1000Base-T) or optical (1000Base-SX) Gigabit Ethernet.

Reporting

The input signal is demodulated, demultiplexed and optionally descrambled. After that, the content is inventoried and reported to the Analyzer. Workstations will display the information whenever a deviation to the stream configuration is detected. The information about the transport stream already available to the Analyzer will be taken into account, so that it will only report about errors that happened after leaving the central headend.

Transport stream recorder

Independently from the analysis cycle a transport stream can be locally recorded on hard disk. Afterwards it can be transported and analysed and by this way it increases control on the network from start to finish.

Local control

All decentralised head-ends in a digital television distribution system can be equipped with Local Zappers, by this way extending the range of control up to the local networks. The place of installation usually is a local head-end or distribution centre.

Scalability

Because of simple and cost-effective design, the Local Zapper can be applied multiple times integrated as part of the local network itself. By doing that, network control is even more extended. By use of Internet access the system can even be placed at an end user's premises for local investigation purposes.

Network design IDM100: Local Zapper

IDM100

IDM100
Product description

Workstations

User control of the system is done by means of Workstations. Ordinary web browser installed on desktop personal computers, laptops or smartphones can be used.

Access by the Internet

The way the system is designed makes it possible to control the systems on distance; a normal Internet connection will do.

Scalability

The amount of workstations is up to 20 on one single Analyzer and can be extended. Access by Internet makes it possible to access the system from any place by network engineers working in shift duty.
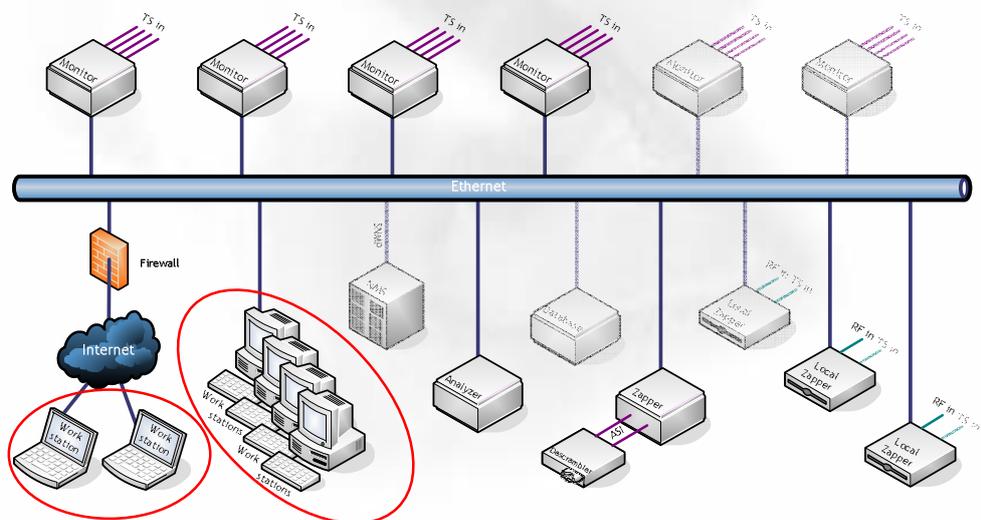
Network design IDM100: Workstations

IDM100

IDM100
Functionality

Powerful functionality

The IDM100 offers complete network monitoring of digital radio and television, over a range of locations. Control on distance by means of Workstations equipped with standard web browser and communication by common Ethernet simplifies implementation.

Multiple level control

Analysis at different levels varying from – Green is all right! – up to a detailed investigation of the DVB tables adds up to the application of this system as an all-in-one solution. A flexible way of configuration gives outlook to a pragmatical way of network control.

Continuous operation

Permanent control on availability of service by means of a guarding eye that is looking attentively to services, pictures, sound channels, subtitling, teletext, electronic programme guide, DVB service information and other transport stream components. Audiovisual presentation gives insight on the end result at the customer and makes overall control possible from any location.

Examples

The following examples give an impression of the versatile possibilities.

Actual status report

- Direct view on the state of the network of all digital radio and television channels.

- Display in colours gives overview in a glance in which transport stream a problem is detected.

- Text messages related to the channel indicate directly which one is affected without any necessary action by the user.

- Report of the gravity of the deviation gives additional informational about the impact for the customer.

- Selection of transport stream, service and kind of alarm keeps the display orderly.

IDM100

IDM100
Functionality

Event log

- Selection of events from the past by using one mouse click.

- Orderly grouping in selections on service and error level.

- Switching between active and resolved events makes instantly clear how long and how often a problem occurred.

- Grouping of message takes care of the necessary overview, even in case of a packed log history.

Channel selection

- Selection on individual channel level results in a clear and orderly display.

Error level selection

- Selection on error level helps to separate the messages.

- Clear grouping by selection on error level, active and resolved messages keeps the screen orderly in case of multiple problems in a transport stream.

Bandwidth

- A detailed overview displays the relationship of the occupied bandwidth in a transport stream, logically arranged on all available kind of packets.

- Error and scrambling detection fortifies insight in the status of the transport stream components.

Timing accuracy

- Continuous detection and calculation of time stamps validates the stability of the transport stream per service.

- Display of the deviation makes it possible to perform preventive actions before the customer notices interruptions or lip-sync problems.

Audiovisual audit

- Examination of sound and vision checks signal conformity.

- Enumeration of channels and programme data delivers information about the functionality of the electronic programme guide.

- Bandwidth measurement per service displays an overview of the segmentation of the transport stream.

Audiovisual capabilities

IDM100

IDM100
Functionality

Audiovisual status

- Momentary display of sound and vision gives opportunity for network monitoring on distance, independently of the availability of the television signal.

- Detection of sound carriers simplifies checking of preferred language channel.

- Status information like aspect ratio, resolution, video encoding mode and AFD-state (Active Format Description) gives optimum insight in video properties.

- Optional video and audio can also be checked live as streaming video.

Audiovisual archives

- Storage of programme material gives access to pictures and sound from the past up to one month ago for further analysis of past disturbances in the network.

Service properties

- Enumeration of detected services per transport stream.

- Specific settings for services with scheduled services controlled by an internal agenda.

Status report audio and video

Transport stream settings

- Determination of passwords, service names, electronic program guide settings, timing references and alarm thresholds for audiovisual monitoring per transport stream.

IDM100

IDM100
Functionality

Table configuration

- Enumeration of the composition of the transport stream gives access to the configuration of all parts and the possibility to store these in memory.

- Detection of components that are not stored in the configuration gives the user the option to exclude parts of the transport stream for validation.

- Overview of the tables can be used for in-depth analysis.

Table repetition rates

- Dynamic changeable adjustments for repetition rates and bit rates of tables allow flexibility up to individual level.

- According to the network engineer's preferences, alarm thresholds can be applied more or less strictly than the standards and recommendations to allow pragmatic operational monitoring of the network.

Bandwidth

Bandwidth configuration window

- Flexible settings of the occupied bandwidth in a transport stream on packet level enables

detection of loss and overload by measurement and comparison of expected values.

- According to the network engineer's preferences, components can be included and excluded in able to use dynamical criteria.

Table display

- Display of the content of the tables discloses all system and service information for an in-depth analysis.

- A folded menu structure helps to keep a fully loaded screen orderly.

Table display

Application preferences

- Options in alarm levels up to individual messages allows the network engineer to determine gradations.

- Several foreground and background colours can be assigned to a certain alarm level.

OpenTV applications

- Adaptation on demand or customer specific needs like monitoring of OpenTV applications.
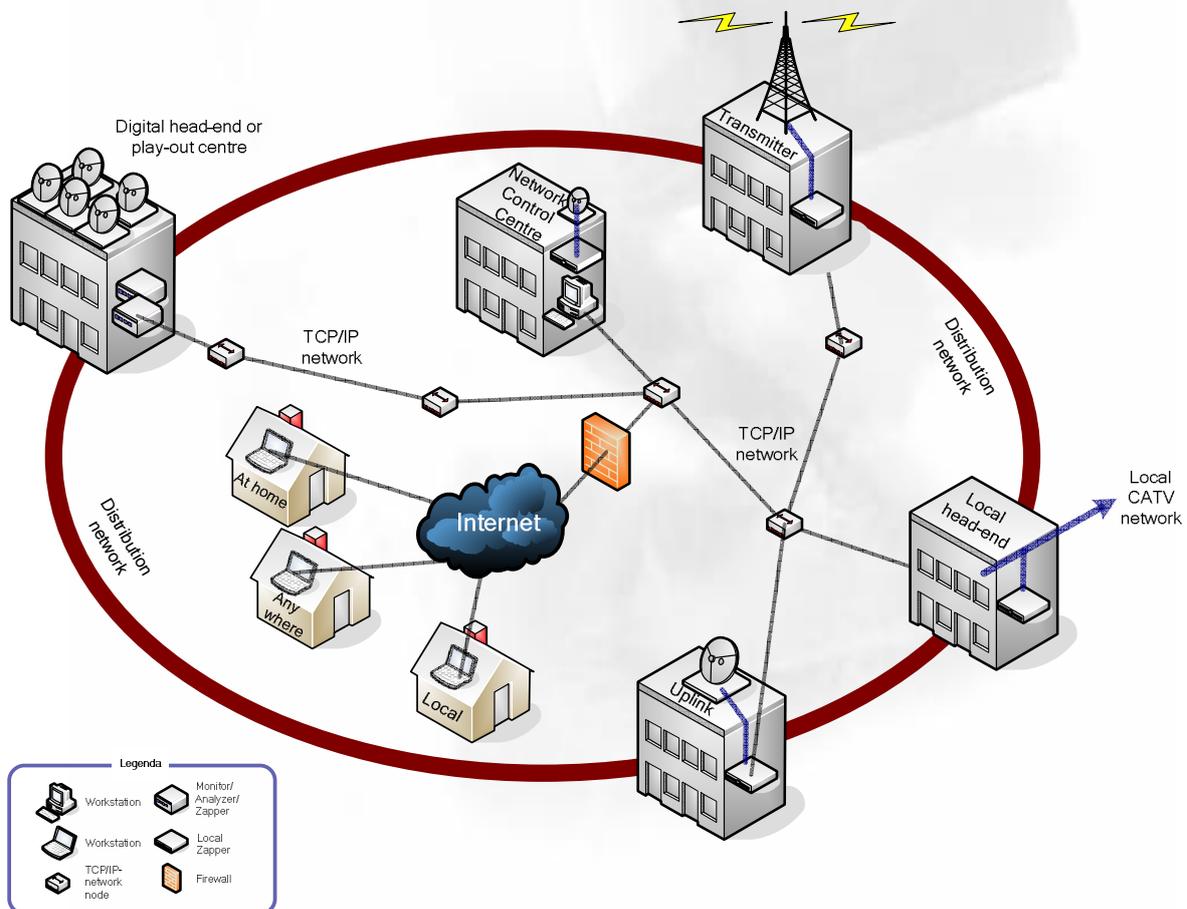
IDM100

IDM100
Networks

Integration

The IDM100 series are applicable in several kinds of network architecture. Implementation is possible in DVB-C/S/T and IPTV-networks, as well as analog.

Centralised monitoring

Normally the Monitor is placed at the location where centralised processing of digital radio and television services is performed; the head-end or digital play-out centre. From one or more of these source locations, local head-ends are supplied with signal by means of – in most cases redundant -optical networks or microwave links.

Monitoring at home

In most cases the operating company owns a Network Control Centre at their disposal. At that place Workstations are operating. However, control and monitoring is not only limited to that location. At home or at any other place, operational control is possible via Internet. By use of the audiovisual options within the IDM100 one is not dependent of the availability of the television signal, what is important for network engineers working in stand-by duty.

Application examples of network integration

IDM100

IDM100
Networks

Decentralised monitoring

For monitoring on local level, decentralised head-ends are the most suitable locations for the Local Zapper. However, the functionality is not only limited to that.

Local monitoring

Local Zappers can be installed in bigger amounts further on in the distribution chain – even up to at home - creating a wide branched monitoring network. Communications among the several components of the IDM100 is done by common Ethernet.

Integration in a DVB-C network

DVB-C stands for Digital Video Broadcasting Cable where in most cases for distribution of radio and television signals, a hybrid network of optical fibre for the mainstream and coaxial cable for the local network is used. The method of transfer is QAM (Quadrature Amplitude Modulation).

Integration in an IPTV network

For the distribution of radio and television signals by means of an IPTV network, the local connection from the distribution centre to the customer in most cases is performed through a telephone line by means of some ADSL (Asynchronous Digital Subscriber Line) version or through fiber to the home.

Integration in a DVB-T network

DVB-T stands for Digital Video Broadcasting Terrestrial by which distribution is primarily performed wireless, by means of local and regional transmitters. The method of transfer is OFDM (Orthogonal Frequency Division Multiplex).

Integration in a DVB-S network

DVB-S stands for Digital Video Broadcasting Satellite by which distribution also is performed wireless, but in this case by means of a communications satellite. The method of transfer is QPSK (Quadrature Phase Shift Keying).
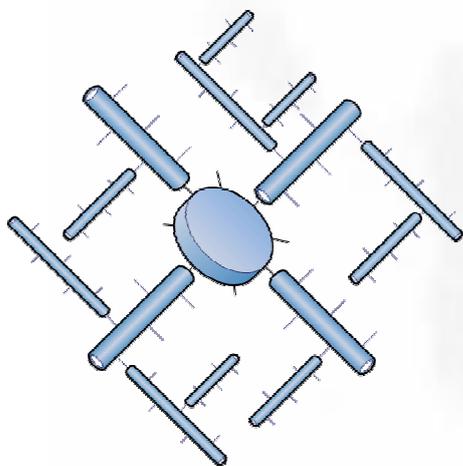
IDM100

IDM100
Specifications

Capacity

Monitor ASI:

- 1-16 transport streams simultaneously, maximum 90 Mbit/s each

Monitor GbE:

- 1-24 transport streams simultaneously, maximum 100 Mbit/s each (UDP/IP or RTP)

Analyzer:

- 48+ transport streams simultaneously, up to 10 Monitors, up to 20 Workstations, practical unlimited amount of Zappers and Local Zappers

Zapper:

- 500 radio and television services

Local Zapper:

- 40 transport streams

Functionality

Transport stream parameters

- Identity
- Overload
- Total bandwidth
- Net bandwidth
- Packet loss

Components

- New, missing or changed services
- Bandwidth per component
- Packet loss
- Scrambling presence
- Change of Scrambling Control Word

- Presence of PCR time stamps and timing variations (jitter, accuray and frequency offset)
- Descrambling*
- Relationship between PTS and DTS time stamps to the PCR*
- Frozen video*
- Audio silence per channel*
- Programming of scheduled programmes
- AFD-status

PIDs

- Bandwidth
- Packet loss

NIT, SDT, BAT

- Availability of services in the SDT en PMT of other transport streams (inter-TS checks)
- Linkage descriptor, channel list descriptor, service list descriptor
- Operator-specific descriptions

EIT present/following and EIT Schedule specific

- Completeness of the EIT
- Timing accuracy of the EIT present-following
- Availability EIT Other
- Status of the EIT flags in the SDT

* These option can be recalled afterwards even on scrambled programmes.

IDM100

IDM100
Specifications

PSI/SI tables

- PAT, CAT, PMT, SDT, NIT, EIT p/f, EIT Schedule, TDT/TOT

- New, missing or changed tables

- Mutual consistency among SI-tables

- Repetition rate

- CRC-error

Audiovisual

- Ability to descramble video and audio

- Video by carrousel stored as a picture

- Audio (standard/multi language/radio) by carrousel stored as a fragment

- Audiovisual archives of both up to one month

- Live decoded video and audio (optional)

OpenTV specific

- Module presence, age and size

- Descriptors in the PMT and NIT
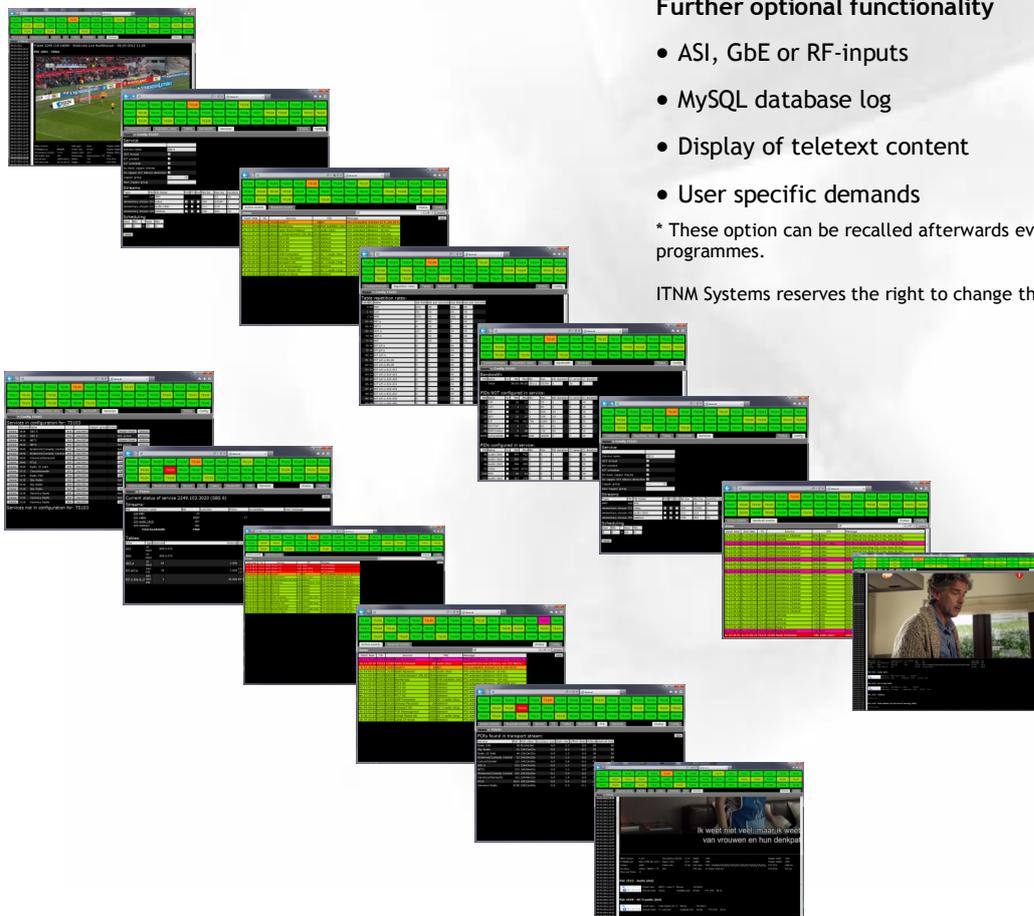
Other functionality

- SNMP-generator

- XML-RPC interface

- Transport stream recorder

- AVC and AC-3 support

Further optional functionality

- ASI, GbE or RF-inputs

- MySQL database log

- Display of teletext content

- User specific demands

* These option can be recalled afterwards even on scrambled programmes.

ITNM Systems reserves the right to change the specifications

IDM100

IDM100
Foundation

Construction

The foundation of the IDM100 components Monitor, Analyzer, Zapper and Local Zapper is a Supermicro industrial server controlled by Linux. The power supply and hard disk can be swapped from the outside. A watchdog circuit is monitoring the availability continuously. Communications for maintenance and SNMP* can be done by means of common Ethernet. The foundation can optionally be equipped with redundant power supplies and ditto hard disks. The amount of ASI-inputs of the Monitor will be limited up to four ASI-inputs in that case.

Front and rear panel of the industrial server

Standard configuration

Industrial server
Watchdog circuit
Swappable power supply and hard disk
No keyboard or mouse needed to start up
Mains 230 V 50 Hz (other available on request)
Used power 150-250 W*
Colours beige and black

Dimensions (width x depth x height):
1 RU = 438 x 705x 43 mm

Environmental conditions:
Temperature range storage 0 – 50 ˚C
Temperature range operating 10 – 35 ˚C
Humidity 8%-90% non-condensing

Safety and EMC:
CE compliant (EN 60950/IEC 60950)

Connections Analyzer:
1 x Control/SNMP* (10/100/1000Base-T)

Connections Monitor:
1-16 x MPTS-input (ASI)*
3 x MPTS-input (1000Base-T)*
1 x Control (10/100/1000Base-T)*

Connections Zapper:
1 x SPTS-input (ASI descrambler loop)
1 x SPTS-output (ASI descrambler loop)
1 x Control (10/100/1000Base-T)

Connections Local Zapper:
1 x RF-input (QAM-16/32/64/128/256)*
2 x MPTS-input (10/100/1000Base-T)*
1 x Control (10/100/1000Base-T)

* Dependent on the configuration

ITNM Systems reserves the right to change the specifications of the configuration.

IDM100

IDM100
Management

Purpose

Besides powerful and advanced functionality and cost-effective design durability of a monitoring system is of vital importance. A service level agreement is the appropriated means for a user defined improved or continuous availability.

Service level agreement

A service level agreement covers preventive as well as corrective maintenance of the whole system as well as possible bugs in the applications. The standard rate is 7 % of the installed base per year, after the first year, which is free of charge. The standard coverage in the Netherlands implies a maximum response time of one hour during seven days a week between 9 o'clock in the morning and 11 o'clock in the evening. The response time at the location is four hours maximum. Spare material can be included on customer's demand as part of the delivery.

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