

NetUP IPTV Complex



*A scalable IPTV solution for
medium and large service
providers*

*DVB to IP gateway / Streamer,
VoD/nVoD, TVoD / Time-Shift,
Middleware, Billing System,
Conditional Access System*

 **NetUP**

www.netup.tv

NetUP IPTV Complex

Overview

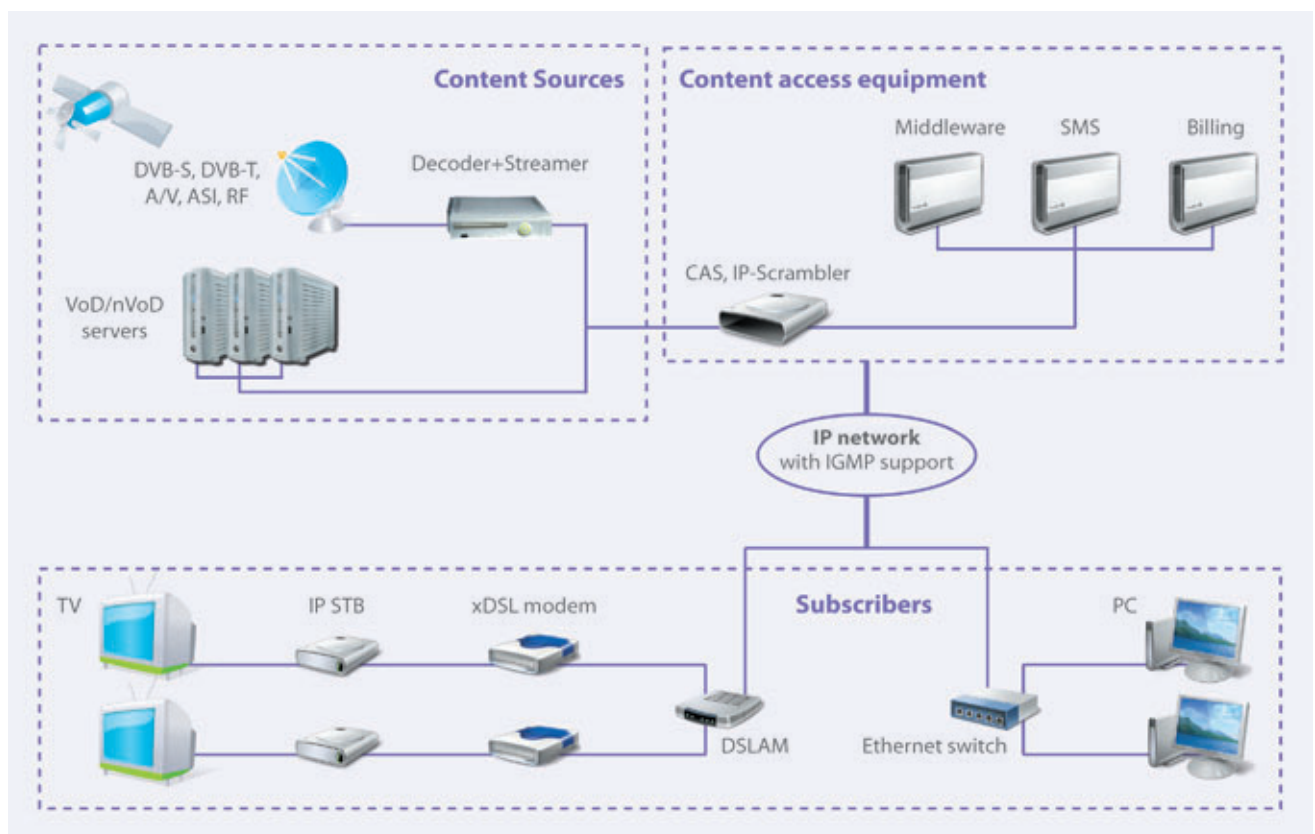
The NetUP IPTV Complex is a complete solution incorporating the following services:

- satellite, terrestrial and cable TV channels (streaming);
- Video on Demand (VoD);
- near Video on Demand (nVoD);
- TV on Demand (TVoD);
- Time-Shifted TV;
- Network Personal Video Recorder (NPVR);
- various interactive features of IP set-top boxes (bill view, Web browsing, etc.)

NetUP's IPTV Complex includes all necessary systems to broadcast TV or video over IP networks, all tightly integrated:

- Subscriber Management System;
- Billing System with flexible rating engine;
- Conditional Access System (CAS, DRM), protection against unauthorized access at different levels;
- interactive user's interface for IP set-top boxes (Middleware);
- content source and management: (DVB-IP gateways, MPEG encoders, VoD/ nVoD servers).

Scalability is assured as all IPTV Complex elements are connected in a cluster architecture. All software is developed on basis of NetUP's Business Server (NBS), a robust development platform designed to support client-server applications of any complexity.



NetUP DVB to IP Gateway / Streamer

The NetUP Streamer receives live satellite or terrestrial channels directly from antenna (DVB-S, DVB-S2, DVB-T, RF) or via cable, from a studio or from third-party receivers (DVB-C or ASI). Analog TV or radio channels (A/V) are handled by real-time MPEG encoders built into the streaming server (up to 12 analog feeds per device). Received streams are streamed in their native format (e.g., MPEG-2 Transport Stream) as IP multicast.

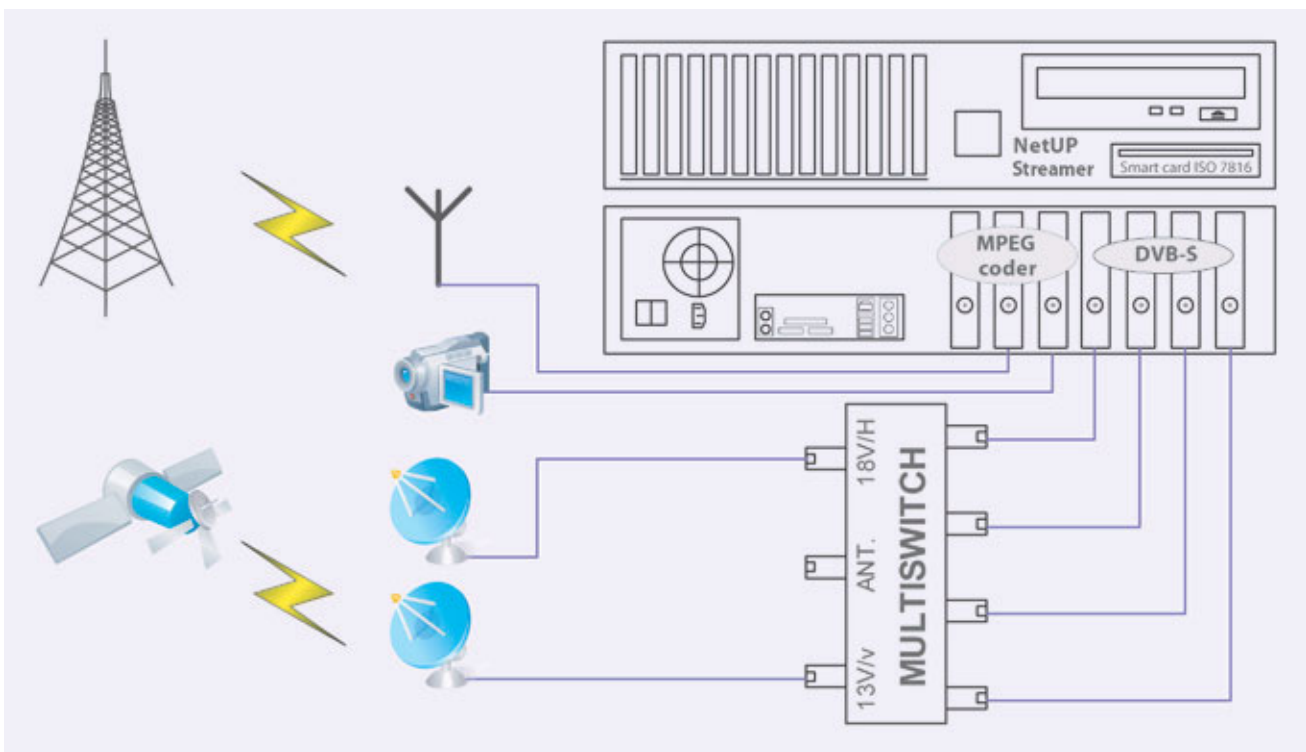
Performance of one device depends on configuration

and can be up to 100 channels. Maximum bandwidth of the device is 400 Mb/s that allows to stream high quality video and audio. Decoding is based on using CA modules (CAM's). Recommended CAM's are Aston Pro Solutions and PowerCAM Pro.

NetUP's Streamer combines the functions of DVB receivers, decoders, encoders, multiplexer, IP streamer, and multicast router (IGMP querier), all in a 4U rack-mount server with single management interface.



NetUP's DVB to IP gateway/ streamer



Content ingest – NetUP's DVB to IP gateway

NetUP IPTV Complex

Video on Demand & Virtual Cinema

The NetUP Video on Demand server is built on an industry-standard platform and supports over 100 concurrent streams (1000 subscribers at normal VoD peak take-up rate) at typical MPEG-2 compression rate of 4 Mb/s per stream. Both unicast and multicast modes are supported.

Server storage comprises four hot-swap SATA-II hard disks. The total HDD space in the standard configuration is 3 TBytes or over 800 movies in the DVD quality. External data storage can be connected to the server where required.

Movies are stored in MPEG-2 or MPEG-4 AVC (H.264) transport stream — both SD and HD are supported. Compression rate can be modified to match IP set-top box and/or downstream network performance.

CA system plug-in, built into VoD server, allows real-time encryption of video streams to protect video content from unauthorized access.

Video content can be loaded via smb or ftp. We have included a module for transcoding DVD's into the required format direct to the HDD of the server. This functionality is available in the command line mode to automate transcoding the disks.

Movie descriptions displayed in the graphical user interface of an IP set-top box can be synchronized with a central database on the Internet ("Media Knowledge Base", www.media-kb.com). The database is filled with complete and structured information on multimedia content, multilingual and freely accessible.

The server is implemented in a 1U rack-mount case. It is possible to connect VoD servers into a cluster. This allows achieving almost any performance and providing VoD in distributed networks.

Time Shifted TV, Network Personal Video Recorder, and TV on Demand are implemented as a separate server based on the same framework.



NetUP's VOD server

TV on Demand & Time-Shifted TV

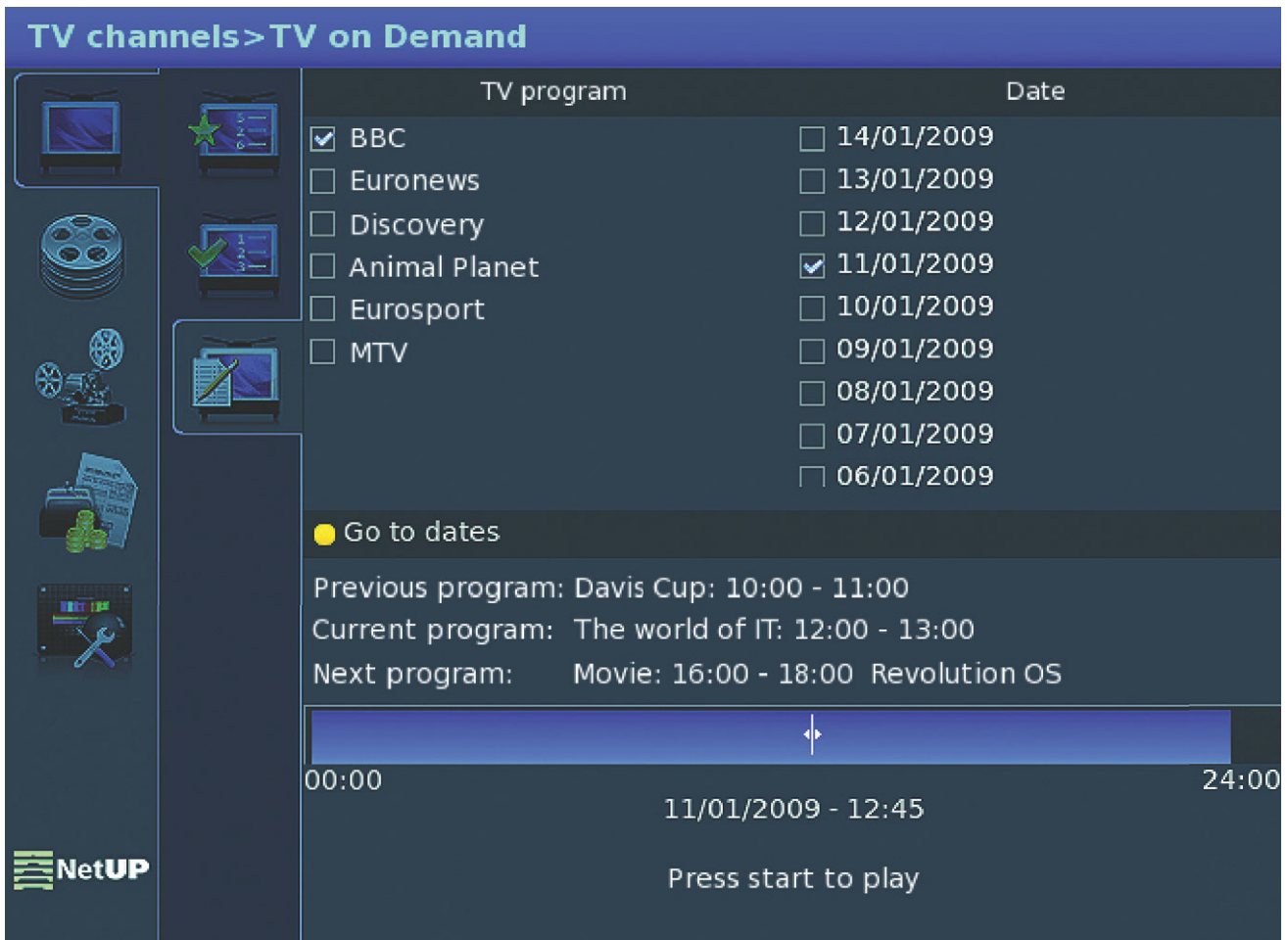
Delayed TV program viewing can be considered the most demanding among all interactive TV services. Only IPTV technology provides a user with a possibility to pause or rewind TV programs. Such service is referred to as Time-Shifted TV. In addition, TV on Demand service is intended for viewing recent TV programs by choosing the TV program from the archive.

A TV channel received from a satellite or a broadcasting station is recorded on the server. On browsing the recorded media content on IP set-top boxes, information about the TV program start time is displayed. This information is

provided to the system either manually or automatically from EPG. Browsing the recorded TV programs can be done using the program start markers or by simply choosing an arbitrary date and time.

TV on Demand and Time-Shifted TV services are implemented in the same server. The device is identical to the VOD server, includes 4 hot-swappable SATA-II HDD's, 750 GB each.

The Conditional Access plug-in allows encrypting the output streams on the fly to protect media content from unauthorized access.



TV channels > TV on Demand

TV program	Date
<input checked="" type="checkbox"/> BBC	<input type="checkbox"/> 14/01/2009
<input type="checkbox"/> Euronews	<input type="checkbox"/> 13/01/2009
<input type="checkbox"/> Discovery	<input type="checkbox"/> 12/01/2009
<input type="checkbox"/> Animal Planet	<input checked="" type="checkbox"/> 11/01/2009
<input type="checkbox"/> Eurosport	<input type="checkbox"/> 10/01/2009
<input type="checkbox"/> MTV	<input type="checkbox"/> 09/01/2009
	<input type="checkbox"/> 08/01/2009
	<input type="checkbox"/> 07/01/2009
	<input type="checkbox"/> 06/01/2009

● Go to dates

Previous program: Davis Cup: 10:00 - 11:00
 Current program: The world of IT: 12:00 - 13:00
 Next program: Movie: 16:00 - 18:00 Revolution OS

00:00 11/01/2009 - 12:45 24:00

Press start to play

NetUP IPTV Complex

NetUP Middleware

Middleware is the central part of an IPTV solution. It defines the user's experience and ties subscribers' set-top boxes with the IPTV headend. Performance and functionality of the graphical user interface define the user's demand in IPTV services.

Two approaches exist in implementing GUI for client's devices. The simplest one is to employ a Web browser in an IP set-top box and to build the user's interface with HTML and JavaScript. In this case the GUI is merely a Web page loaded from the middleware server. Web browsers in IP set-top boxes have very truncated functionality, and the whole technology imposes serious limitations to the possibilities of the user's interface. User's interface based on this technology is usually slow, that becomes a real problem in case of High Definition mode.

A totally different approach is used in NetUP's Middleware. The user's interface is a native application developed in C/C++ and utilizing hardware resources of an IP set-top box to the maximum. All graphics and most of the functionality are running on the set-top box rather than on the server. This increases performance of the interface and eliminates the constraints of the Web browser. Unique architecture allows adding new services without stopping the system. Custom layout themes and multiple languages are supported.

The interactive user's interface of NetUP's Middleware provides access to the following services:

- TV channels, favourite TV channels;
- Video on Demand. Movies can be searched by name. Pause, fast forward, and rewind are available. Movie descriptions can be fetched from the multimedia database "Media Knowledge Base", www.media-kb.com;
- near Video on Demand (nVoD). Switching to the selected nVoD show can be done automatically or manually on receiving a message about the show start;
- Time-Shifted TV. Pause/rewind on watching TV programs;
- TV on Demand. Watching recent TV programs pre-recorded on the server;
- Network Personal Video Recorder (NPVR);
- Electronic Program Guide (EPG);
- listening to radio stations.

NetUP's Middleware uses the low level API (SDK) for IP set-top boxes of the world leading IP set-top box manufacturers: Amino, Telergy, D-Link, Hansun, and Teletec.



Graphical User Interface on an IP set-top box

NetUP IPTV Complex

NetUP Conditional Access System

The NetUP Conditional Access System (CAS) encrypts multimedia streams for transmission over unprotected channels. Only authorized users subscribed to the service can play these streams. NetUP's CAS allows an IPTV service provider to strictly control access to the content and build financial relations with subscribers and content providers alike.

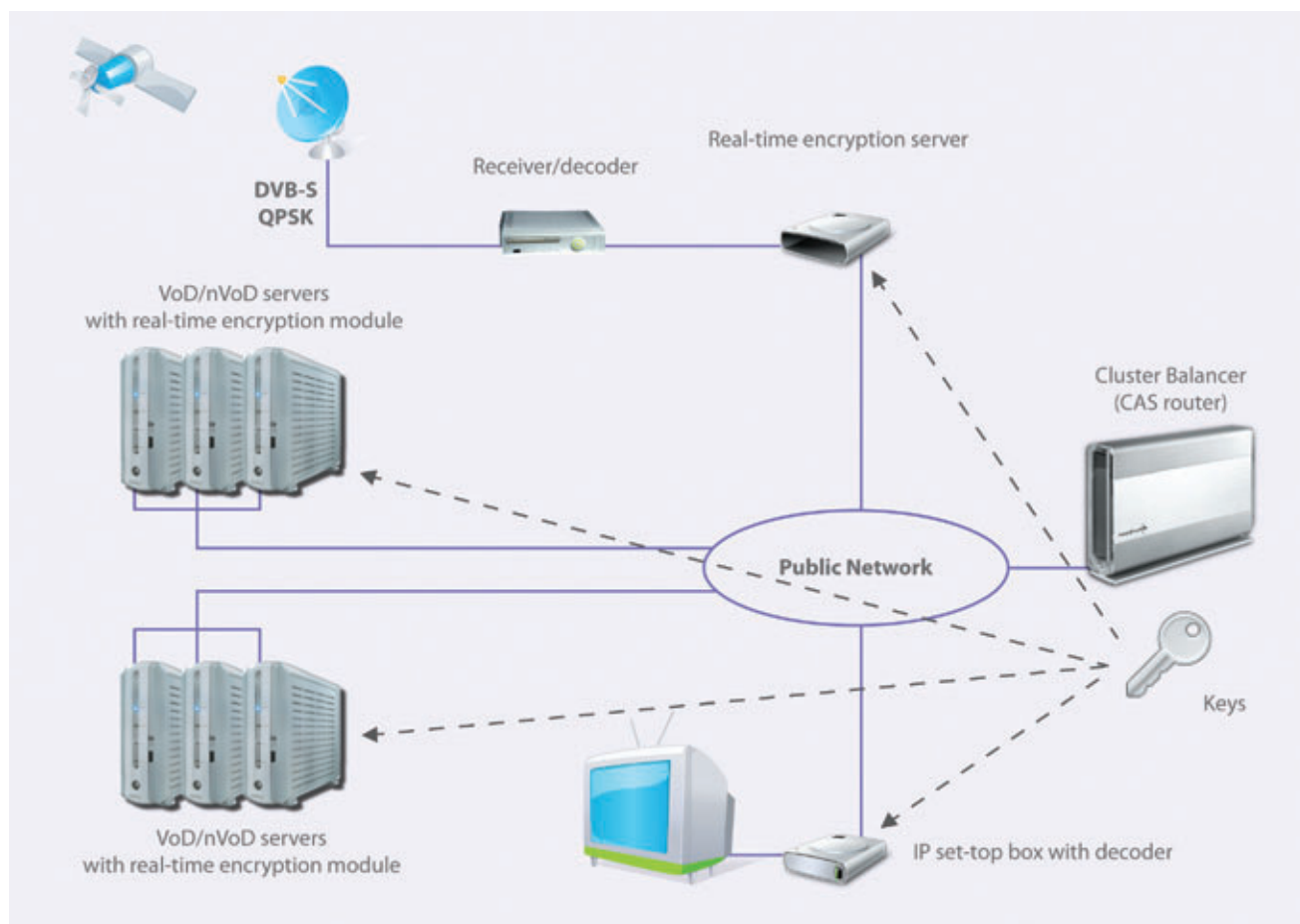
NetUP's CAS consists of the following components:

- real-time encryption server for multicast streams;
- real-time encryption module for unicast streams (VoD, NPVR, Time-Shifted TV and TVoD) - eVoD plug-in;
- query router and encryption key distribution system, a part of the IPTV Cluster Balancer system;
- decoding module for IP set-top boxes.

The encryption algorithm used is CSA (Common Scrambling Algorithm) supported by most IP set-top boxes on the hardware level. This allows decoding "heavy" streams such as for the case of HD Video. For set-top boxes that do not support hardware decoding, the software implementation of the algorithm in a Linux kernel module is used.

The system is developed in C/C++ programming languages with the use of optimized algorithms. Client devices based on x86, PowerPC, Broadcom, STM, TI Davinci and other hardware platforms are supported.

NetUP's CAS was registered in the European DVB Project registry. The CAS identification number (CAID) is 0x4AEF.



NetUP IPTV Billing System

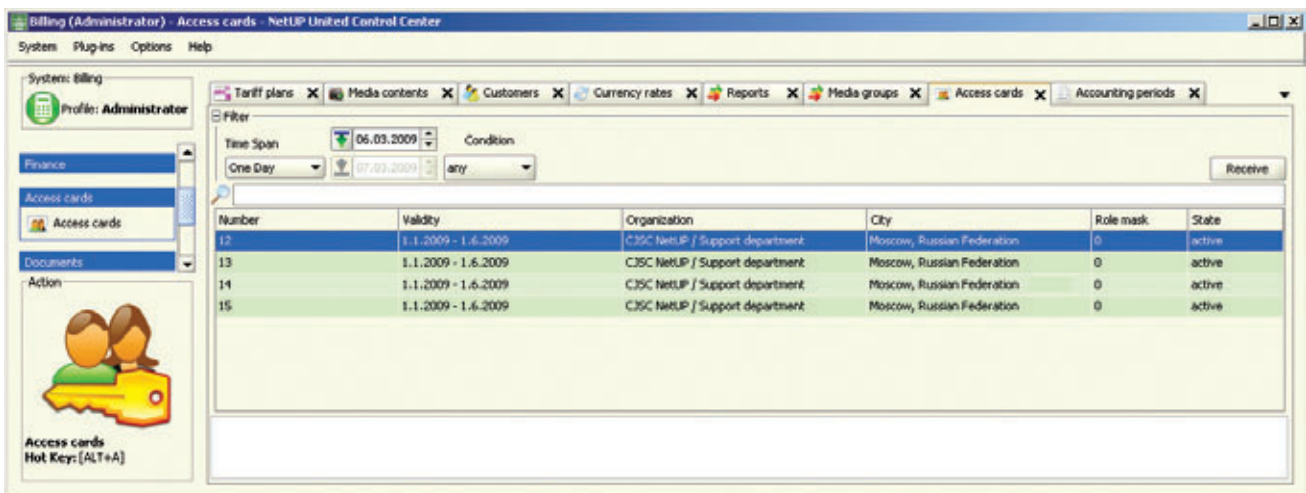
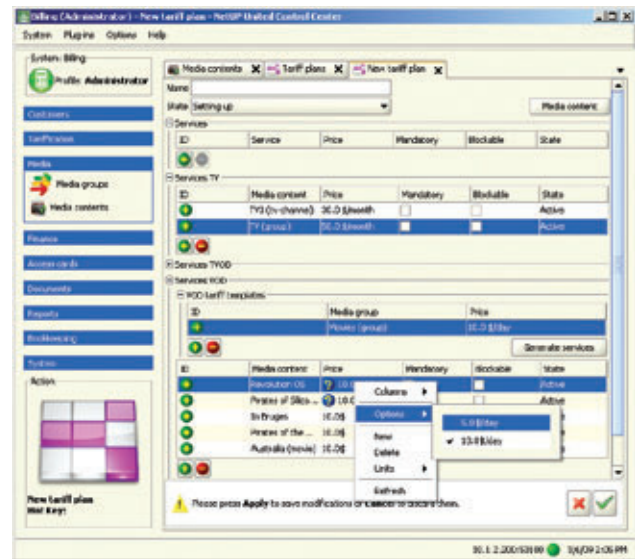
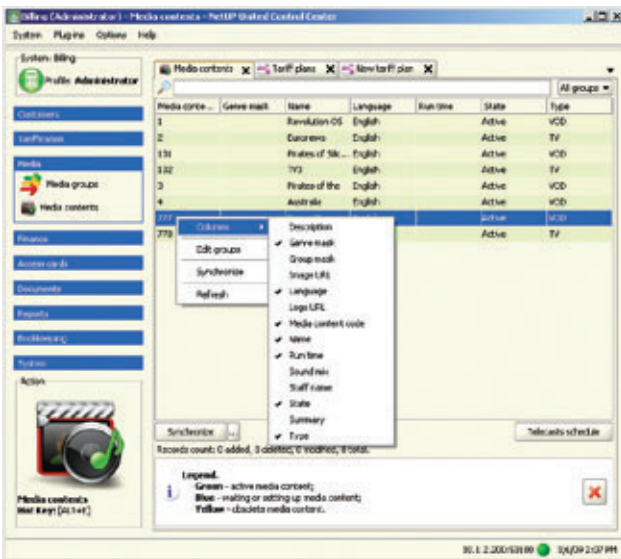
The main functions of NetUP's IPTV Billing System are:

- subscriber database maintenance;
- rating of services;
- creation and management of tariff plans;
- creation of accounting documents;
- access cards management;
- financial reporting.

The billing system enables the service provider to easily add new subscribers, create and assign tariff plans, enable/ disable access to IPTV services, all with automatic real-time update of the subscriber's status in other systems of IPTV Complex.

The billing system can be integrated with any third-party system controlling services of other types, such as Internet access, VoIP, etc.

We have been developing and supporting billing systems for telecoms operators as a core product offering since 2001 and implemented accounting schemes of various complexity for communication services. Besides standard rating schemes, we can implement almost any custom business logic. All specific requirements of a customer are taken into account.



Client's Devices

NetUP's IPTV Complex has been integrated with a large number of IP set-top box models of the following vendors:

- Amino Technologies (www.aminocom.com)
- Telergy (www.telergy.eu)
- Hansun Technologies (www.hansuntech.com)
- D-Link (www.dlink.com)
- Teletec (www.teletec.com.ua)

All IP set-top boxes listed below are integrated with NetUP's Middleware on the low level. The user's interface program code is executed right on the IP set-top box, rather than fetched as a Web page from a server as in case of HTML/JavaScript based systems. The low-level approach allows to achieve a much better performance of the user's interface and richer functionality.

Integration with IP set-top box of any model is possible if SDK is provided.

IP set-top boxes for High Definition video (HD)



AmiNET 130



Telergy T501



Hansun HS6020H

IP set-top boxes for Standard Definition video (SD)



AmiNET 110, 125



D-Link DIB 120



Teletec MAG 100



Teletec MAG 200

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