

White Paper

Customized IPTV setups with TVCaster server appliances

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TVCaster by Motama represents the next generation of IPTV server appliances. TVCaster is a turn-key solution offering all cutting-edge functionality you expect from an integrated DVB receiver, descrambler, remultiplexer, and IP streaming server.

This White Paper presents an overview of the different streaming modes provided by all TVCaster server appliances and explains how to set up and use the different modes. To fully acknowledge the capabilities of each mode, some of the fundamental concepts of DVB tuners and also the clustering features of Motama's server products are introduced.

Keywords

IPTV, DVB gateway, DVB-S2, DVB-C, DVB-T, DVB-ASI, MPEG, Remultiplexing, Unicast, Multicast, Streaming, UDP, RTP, Corporate mode, Home mode, Middleware mode

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Introduction

Unlike other DVB gateways, all TVCaster server appliances provide three different streaming modes. This allows users of the TVCaster servers to better match their requirements – and at the same time enables completely new application scenarios not supported at all by other competing products.

The three supported modes are

- Corporate mode for Live TV streaming in broadband networks, content delivery networks, hospitality, and other corporate networks.
- Home mode for personal TV access offers a distinct assignment of tuners to clients with full selection of all available TV channels and ultra-fast channel switching.
- Middleware mode offers freely programmable stream processing on the TVCaster appliance itself or integration of processing capabilities into applications running on other systems by using the capabilities of the NMM software by Motama.

Clustering feature of the TVCaster series

All TVCaster server appliances provide a built-in clustering feature. This means that additional TVCaster servers can be added to an existing network at any time. This allows for seamlessly increasing the number of different TV or radio channels that are available within the network simultaneously.

To fully understand this concept of scalability, it is important to review the capabilities of DVB tuners. Each tuner can only tune to a certain transponder (also called bouquet) at a time, which is specified by a number of technical parameters. On such a transponder, you will find a number of different TV and radio channels. For example, a typical DVB-S2 transponder for SDTV will provide between 5 and 10 different TV channels; for DVB-S2 between 2-4 different HDTV channels are available.

How channels are assigned to different transponders is predefined by your provider. You need to consult your satellite, cable or terrestrial provider for a complete list of transponders. Based on this information and the selection of channels you would like to stream, you can then determine how many DVB inputs you need. Then, you can select the types and numbers of TVCaster products to fulfill your requirements.

One of the main features of the TVCaster is to be able to re-transmit each TV or radio channel of a transponder as separate IP stream to your network. This is referred to as remultiplexing from MPEG Multi-Program Transport Stream (MPTS) to a number of Single-Program Transport Streams (SPTS), i.e. going from a single DVB bouquet to a number IP streams, one for each TV or radio channel (see Figure 1). This feature is important since a lot of streaming clients only support handling a single program at a time. Providing separate IP streams also allows for a more fine-grained access of content and therefore avoids wasting network bandwidth.

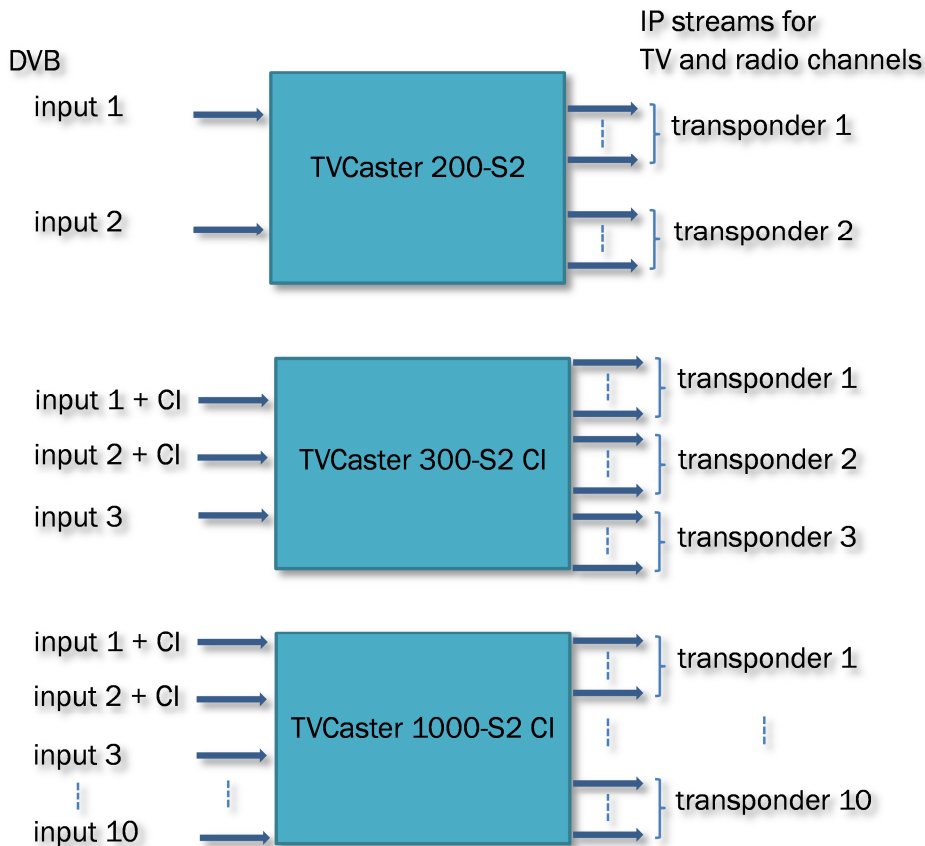


Figure 1

TVCaster server appliances available for DVB-S / S2 and the number of DVB inputs and CI slots available for each model.

Servers for DVB-C, DVB-T and DVB-ASI are also available, please refer to <http://www.motama.com/tvcaster.html>.

Consider you have a TVCaster 200-S2 up and running, and serving the IP streams for two transponders to your network. If now you would like to increase the number of TV channels available by some channels on other transponders, you can simply plug in additional TVCaster servers to your network. With only a single log-in to the web interface you are able to configure all available systems. The different numbers of DVB inputs and CI slots allows customers to choose the combination of TVCaster servers that matches their requirements.

Corporate mode

Corporate mode is used for streaming live TV (or radio) to a larger number of clients within an IP network. Typical applications include

- Broadband networks of telecommunication providers or content delivery networks,
- Hospitality, such as networks in hotels, cruise ships, hospitals,
- Business, such as networks in companies, universities, schools and other institutions.

In corporate mode, a single stream is typically created for each TV or radio channel to be provided. This is done by specifying a networking address for each stream, either a unicast or multicast address. In addition, the streaming protocol can be configured to be UDP or RTP on top of UDP.

Multicast allows for handling larger number of streaming clients (such as set-top boxes). In contrast to unicast, multicast streams from a single sender will be sent to a group of receivers by automatically creating copies for all registered receivers. A receiver only needs to 'subscribe' to a stream for this to happen.

On the downside, multicast networking requires multicast-enabled network components along the complete patch from sender to receiver. In a local area network this can be achieved by employing multicast enabled switches, which are typically by a factor of 10 more expensive than switches not supporting multicast.

Figure 2 shows a typical setup in corporate mode, for example within a multicast-enabled network of a telecommunications provider, or within the network of a hotel. A number of TVCaster server appliances provide multicast streams for different TV and radio channels. Clients, such as set-top boxes attached to TV sets, are able to access these streams individually by receiving data from the multicast address corresponding to a certain channel. Channel-hopping is done by going from one multicast stream to another.

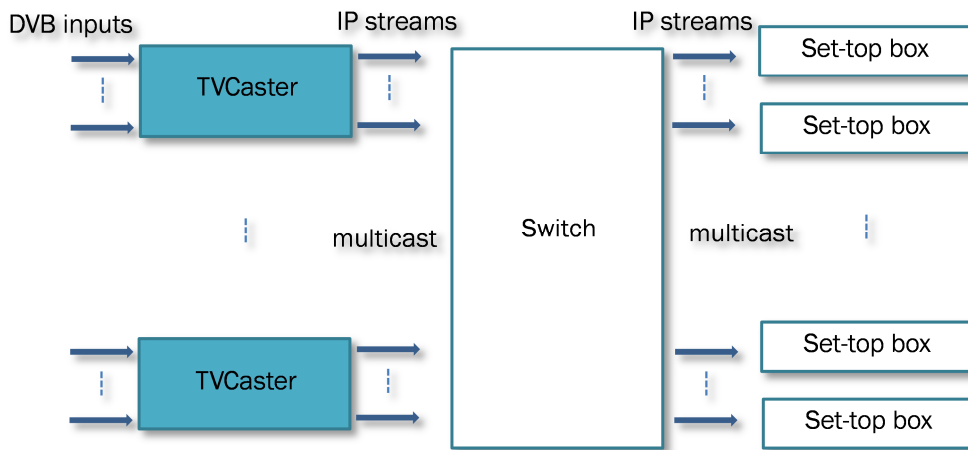


Figure 2

Setup in corporate mode with several TVCaster servers in cluster streaming TV and radio channels using multicast networking to clients (set-top boxes).

But how does the client know which streams are available? Instead of manually configure the clients, the easiest way is to query this information by using the free TVCaster-SDK¹. This can be done by either using the C++ API (available for Windows, Linux, and Mac OS X), by PHP, or by using the XML-RPC API (both available for almost all platforms). The TVCaster-SDK also provides a number of PHP/HTML pages which can be loaded directly from a set-top box providing a user interface based on a web browser. The examples provided with the TVCaster-SDK also demonstrate how to access a further feature of the TVCaster servers, namely the server-side electronic program guide (EPG), which allows to directly access all related information from the server.

These examples can be used as reference for creating a custom user-interface or for integrating this option into a custom IPTV middleware for managing content in hospitality or other operated network.

If multicast networking is no option for you, or you need to use unicast due to the underlying networking infrastructure, a TVCaster server can also be configured to stream a unicast streams for each client, up to the overall limit of the bandwidth supported by the TVCaster server. If a larger number of clients needs to be supported, we recommend to use RelayCaster server appliances² by Motama as additional components in your network.

Home mode

In contrast to corporate mode, home mode is targeted towards personal and individual access to TV and radio channels. In this mode, a specific client device is assigned to a specific tuning device of a TVCaster server appliance. While a client in corporate mode is restricted to receive one of the available IP streams, home mode allows a client to dynamically switch to any channel available from the original DVB feed.

Again, you might ask how the home mode can be used. It is as simple as in corporate mode described above. First, you need to configure a tuning device to this mode. Then you need to register a client device by automatically discovering it, or by specifying its hostname or IP address. In both cases, a specific password, such as the MAC address of the client, is used as authentication mechanism from client to server. Furthermore, a specific list of TV and radio channels can be uploaded to the TVCaster server for each tuner individually to customize the selection of available channels.

Controlling a tuner is done by using the TVCaster-SDK, which supports C++ (available for Windows, Linux, and Mac OS X), PHP, and XML-RPC (both available for almost all platforms). Changing the channel in home mode creates a unicast stream for the specific client. All TVCaster products offer an ultra-fast channel switching for providing the best possible user experience. The TVCaster-SDK also provides a number of PHP/HTML pages which can be loaded directly from a web browser installed on a client, such as a set-top box. The sources of these PHP/HTML pages can be used as starting point for creating a custom user-interface or for integrating this option into a custom IPTV middleware for managing content in hospitality or other operated network.

¹ More information regarding the TVCaster-SDK is available online:
<http://www.motama.com/tvcastersdk.html>

² More information regarding RelayCaster server appliances is available online:
<http://www.motama.com/relaycaster.html>

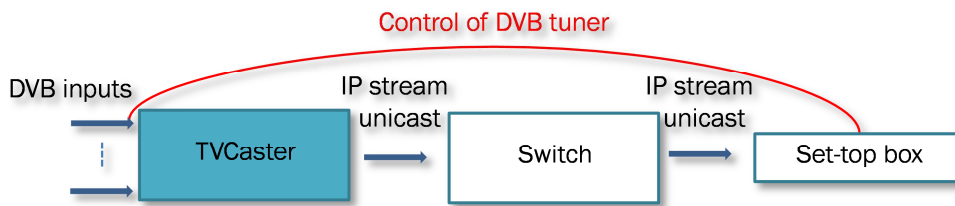


Figure 3

Setup in home mode with a set-top box controlling the DVB tuner of TVCaster server appliance to stream TV or radio channels with unicast.

Figure 3 shows a setup with a TVCaster server and a client (set-top box) using home mode. This setup is interesting whenever the number of clients is relatively small, but the number of different TV and radio channels to be accessed is high. For example, in a private home with four users accessing four set-top boxes, and each user wanting to access 150 different TV channels, which are distributed between 15 different transponders, using the home mode only requires 4 DVB inputs (i.e. one for each user), in contrast to 15 when using corporate (i.e. one input for each of the 15 transponders). Furthermore, this setup does not require any multicast-enabled switches since only unicast networking is used.

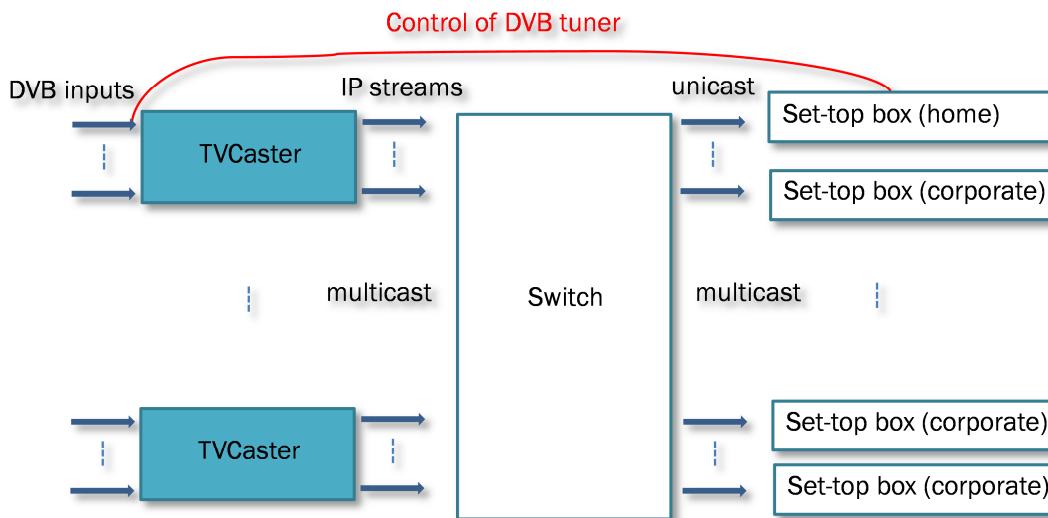


Figure 4

Setup with both home and corporate mode: A single set-top box controls the DVB tuner of a TVCaster server appliance and receives a unicast stream; all further set-top boxes receive multicast streams.

Figure 4 shows a setup using both corporate and home mode, for example within a hotel or a cruise ship. The idea behind this setup is to provide a fixed number of preconfigured TV streams for all standard rooms using multicast streaming in corporate mode (e.g. 20 to 40 different TV channels). In addition, more exclusive and more expensive suites in the hotel offer personalized TV access by configuring the set-top boxes in these rooms to use the home mode and unicast networking. The hotel

management will then upload a personalized channel list at the time the guest checks in. This list will contain a much richer selection of TV channels specifically suitable for the guest, e.g. several hundred selected TV channels including foreign channels in the mother tongue of the guest. In addition, the set-top box in such a suite can of course access the available multicast streams available for all guests. For different rooms of the same suite, one can even configure different channel lists, e.g. one list for parents and another one for children staying in a different room of the suite.

Middleware mode

In middleware mode, a TVCaster server acts as freely programmable stream processing appliance which can seamlessly be integrated into customized IPTV workflows. In combination with the NMM software by Motama³, this allows for creating distributed setups of connected components, where each component can run on a different system. For example, the components for receiving and remultiplexing DVB streams running on the TVCaster can be connected to other components running on a different server. All components can be controlled from a single application implemented in C++ on either Windows, Linux, or Mac OS X. Such an application operates in a fully network transparent way, which means that control of components is done by simply invoking methods on interfaces provided by components (RMI, remote method invocations). If distributed components are connected, streaming of data between connected components can make use of any type of protocol provided by NMM, such as UDP, or RTP/UDP, or even reliable data transmission using TCP.

Possible applications for this mode are all kinds of data processing applications, such as format conversion and transcoding of streams, content analysis and generation of meta-data, or reliable archiving of media streams.

Summary

This White Paper described the three different modes available for all TVCaster server appliances and demonstrated some possible application scenarios.

- Corporate mode allows for streaming TV and radio channels using multicast (and also unicast) in broadband, hospitality and corporate networks.
- Home mode supports personal TV access and offers a full customizable selection of all TV and radio channels available from the original DVB feed. This mode is perfectly suited for hotels, cruise ships, private homes, or any kind of installation where a smaller number of clients need access to a broader selection of content.
- Middleware mode is suited for customized professional applications that want to process DVB streams using the capabilities of the NMM software by Motama.

³ More information about NMM is available online
<http://www.motama.com/nmm.html>

TVCaster

TVCaster by Motama represents the next generation of IPTV server appliances. TVCaster is a turn-key solution offering all cutting-edge functionality you expect from an integrated DVB receiver, descrambler, remultiplexer, and IP streaming server. In addition, TVCaster offers advanced features, such as ultra-fast channel switching for individual users, integrated video recorder, extended streaming protocols, and clustering support. This all comes with unmatched openness and full programmability that allows you to seamlessly integrate the TVCaster appliance into your IPTV workflow. TVCaster server appliances are available in following configurations.

Motama

Motama provides solutions for delivery, processing, and presentation of audio and video content in IP networks.

Our product portfolio includes DVB gateways, transcoders, and streaming servers for content distribution.

These products drive applications in IPTV, Internet and Web TV, telecommunications, content delivery networks (CDN), hospitality, and corporate networks.

Motama's key technology - called Network-Integrated Multimedia Middleware (NMM) – provides a software solution for networked multimedia systems, spanning from embedded and mobile devices, to PCs, to large-scale computing clusters. NMM is available as commercial or Open Source version.

Our middleware forms the basis of our own products and is licensed to world leaders in the areas of home entertainment, networking, mobility, and content processing and distribution.

Motama was founded in 2005 as spin-off company from the Computer Graphics Lab at Saarland University, Germany.

Further information about Motama is available from www.motama.com