

# Video Streaming within the Nokia IPDC Solution 2.2

## Nokia IPDC Solution

The Nokia IPDC Solution implements Mobile TV service for DVB-H enabled handsets. A full end-to-end system for free-to-air TV requires only TV content, commercially available stream encoders and DVB-T transmitter equipment in addition to the Nokia IPDC Solution. For pay TV services the solution also needs to be integrated with the GSM service platform.

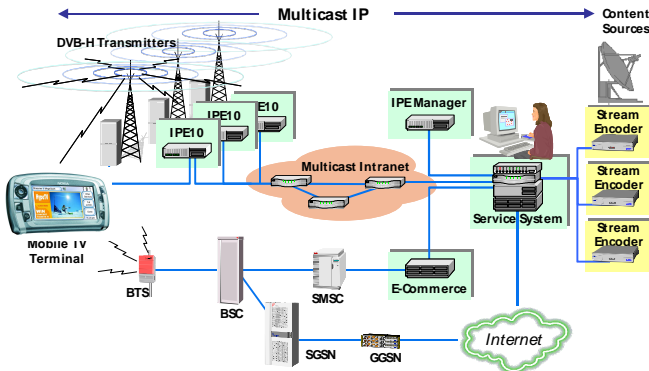


Figure 1: IPDC solution components marked against the end-to-end system

## Streaming Architecture

Video and audio streaming is based on IP multicast. The multicast source is a streaming server or stream encoder outside the Service System. The Service System controls subscription to multicast groups in the IPE network and optionally also the encoding sessions.

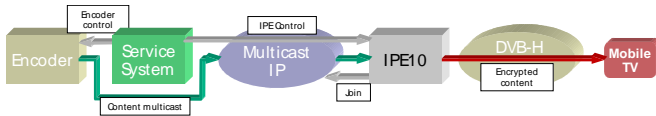


Figure 2: End-to-end stream multicast

Once encoded and multicast to the network operator intranet, the content-carrying multicast group is subscribed to by all the applicable IP encapsulators. Nokia IPE10 supports both Any-Source Multicast (ASM) and Source-Specific Multicast protocols on both IPv4 and IPv6. IP Multicast offers broadcast network operators significant savings in the transmission network link capacity requirements when compared with point-to-point connections to each transmitter station.

Each IPE joins the multicast group carrying the content streams and routes the traffic to the correct DVB-H time slice in either clear or encrypted form. The adjacent figure depicts the resulting streaming protocol stack in the terminal air interface.

The SDP files for the streaming sessions are generated by the Service System and broadcast within the Electronic Service Guide. The correct stream profile is selected when the session parameters are configured. The settings in the encoder must match the pre-selected profile values in order for the terminal to be able to correctly playback the content.

Player	
H.263 / MPEG-4 AMR-WB / AAC	
RTP	RTP
UDP	
IPSec	
IPv6	
MPE	
DVB-H	

## Streaming Architecture

The currently supported encoding settings are optimized for playback on the 7710 handheld. The terminal decoding capacity will improve with commercial devices.

Service	Audio	Video	Frame rate	Resolution
Radio	AAC 64kbit/s	n/a	n/a	n/a
Radio	AAC 128kbit/s	n/a	n/a	n/a

Service	Audio	Video	Frame rate	Resolution
4/3 TV	AMR-WB 23.85kbit/s	H.263 192kbit/s	up to 15 fps	QCIF
4/3 TV	AAC 64kbit/s	H.263 192kbit/s	up to 15 fps	QCIF
4/3 TV	AMR-WB 23.85kbit/s	H.263 300kbit/s	up to 15 fps	QCIF

Table 1: Recommended encoder settings for 7710 terminal

Nokia IPDC Solution has been tested to interoperate with Helix™ Mobile Producer 10 from Real Networks ([www.realnetworks.com](http://www.realnetworks.com)). The encoding software is capable of producing both live streams and stored files. The files can be later streamed with a streaming server, such as Darwin (<http://developer.apple.com/darwin/projects/streaming/>).

## End User Experience



Figure 3: Nokia 7710 streaming exciting winter sports content

The Mobile TV application in the terminal functions much like a regular TV set. The image size and the channel switching time are the main differences. The screen size is a smaller problem than one would think due to the short viewing distance.

Channel switching time in DVB-H based mobile phone TV is longer than people are used to. The rocker hard key can be used to pop up a list of current programs to make the process easier. The channel switch delay is largely dependent on time slicing parameter optimisation. Settings resulting with best battery lifetime yield the longest channel access delay. Before streaming of a given channel can begin, two DVB-H bursts must be received.

## Future Considerations

DVB and OMA standard broadcast will utilize H.264 AVC video and eAAC+ audio codecs. Once the standard is adopted it will also be supported with the encoding solution and terminal decoders.

## Terminology

Term	Description of IPDC implementation
AAC	Advanced Audio Coding, an audio codec
AMR-WB	Adaptive Multi-Rate - Wideband audio codec optimized for low bit rates
Codec	A compatible pair of encoder and decoder carrying a stream over a transmission medium in (usually) compressed form
H.263	ITU-T video compression protocol standard, which is a 3GPP requirement for mobile handsets
H.264 AVC	Also known as MPEG-4 part 10, a new very effective video compression protocol standardized for DVB-H
RTP, RTCP	Real-Time Transport Protocol, an end-to-end transmission protocol for transmitting real-time data such as video and audio over multicast networks. Defined in RFC3550.
QCIF	Quarter Common Intermediate Format, a video format with each frame containing 144 lines and 176 pixels per line. This is one fourth the resolution of Full CIF.