Flexilink

Close-to-analogue performance for live media
Traditional IP service for file transfer etc

Two services

The **synchronous** service is appropriate for packetised continuous media such as audio and video. The per-packet overheads are very small, so PCM audio (including mono and stereo) can be sent in one packet per sample time.

Each synchronous flow is allocated a sequence of "packet start" positions in the byte stream on each link. Routing is cut-through, so buffering delays in switches are minimal; like cross-point routers, it is inherently multicast, and there is no limit to the number of destinations.

The **asynchronous** service is a best-effort service which is appropriate for traditional packet switching. Asynchronous packets can occupy all the bytes on a link that are not used for synchronous packets; when a synchronous packet is transmitted, the asynchronous data stream pauses (even if it is in the middle of a packet), and resumes at the end of the synchronous packet. Thus, long asynchronous packets do not delay the synchronous packets.

Asynchronous packets are label-switched, with the labels being local to each link. IPv4 and IPv6 packets are routed by associating a label with each IP address; this gives the same benefits as the "route caching" in traditional IP routers but without needing content-addressable memory for the table.

Control

The Flexilink architecture makes a clear distinction between the **data plane**, which forwards packets by looking up their labels in a routing table, and the **control plane**, which writes the entries in the routing table.

It includes a **signalling** protocol, which uses messages exchanged between the control plane entities in adjacent network elements (interfaces and switches) to set up and manage media flows, and the routes for asynchronous packets. As well as routing information and QoS requirements, the messages carry metadata describing the content; this provides an explicit indication of the protocol to be used, eliminating the need for artificial mechanisms such as "well-known port numbers". The messages also allow coding formats etc to be agreed between the end-systems when a flow is set up, and they provide a means for out-of-band carriage of metadata during transmission.

Migration

The signalling protocol allows synchronous flows to be carried over less tightly synchronised technologies such as AVB, or over best-effort services such as IP. It reports the level of service that can be expected, allowing end-systems to allocate appropriate amounts of buffering.

Labelling of packets is local to each link, so is independent of the global addressing used to specify destinations in the signalling protocol. URLs can be used as addresses.

Flexilink uses existing physical layers, such as Ethernet over Cat5e; links come up in the legacy technology, and switch to the new format only if both ends support it.

International standardisation

ISO/IEC TR 29181 Future Network — Problem statement and requirements

Part 1 ("overall aspects". published 2012) is an overview which lists the problems with current IP networks and the requirements for new networking technology.

Part 3 ("switching and routing", published 2013) gives more detail of the ways in which current packet switching fails to meet the requirements, particularly for live media, and outlines the Flexilink architecture.

Other Parts address other topics such as mobility, security, and media transport.

ISO/IEC 62379-5-2 Signalling

Specifies the signalling protocol used by Flexilink.

ITU-T SG13 Future Networks

Y.3000 series Recommendations.

Q.14 (Service aware networking in future networks) is working on Software Defined Networking (SDN) and Deeply Programmable Network (DPN) – this may include more features than are supported by OpenFlow.

EBU/SMPTE/VSF JT-NM

Requesting technology to meet identified requirements.

For more detail see http://www.ninetiles.com or http://tinyurl.com/fn-stds