

## **IP DATACASTING; THE ROAD TO CONVERGED SERVICES?**

K. L. Hayler

IP Datacast Forum; Sweden

### **ABSTRACT**

This paper documents the work of the IP Datacast Forum. This Forum has studied the datacasting concept, specifically the complementary implementation of telephony and broadcast technologies, from initial ideas to the development of key specifications. The process has involved the development of basic business and technical models to aid understanding of the potential service capabilities. The formulation of a reference service was a key stage in this process, deriving tangible service concepts from previous study work. Subsequent technical work on a Baseline Specification have taken the concept nearer to the initiation of trial and demonstration activity.

### **INTRODUCTION**

The IP Datacast Forum is a non-profit association of companies founded in January 2002 to explore the potential business opportunities offered by the convergence of digital broadcast and Internet Protocol technologies. The ten founder companies share a common view that the complementary nature of secure one-to-one mobile telecommunications technology and efficient one-to-many broadcast technology offers significant business potential. The work to date has included studies into the business case for IPDC, the technology requirements and the spectrum issues. The work has embraced the use of both DAB and DVB technologies, with an emphasis on DVB. To reflect this the Forum has also prompted the formation of a 'parallel' DVB group, formed to study the impact of IPDC upon DVB specifications and systems. This paper will describe the work of the Forum to date on the business and technical aspects of IP datacasting.

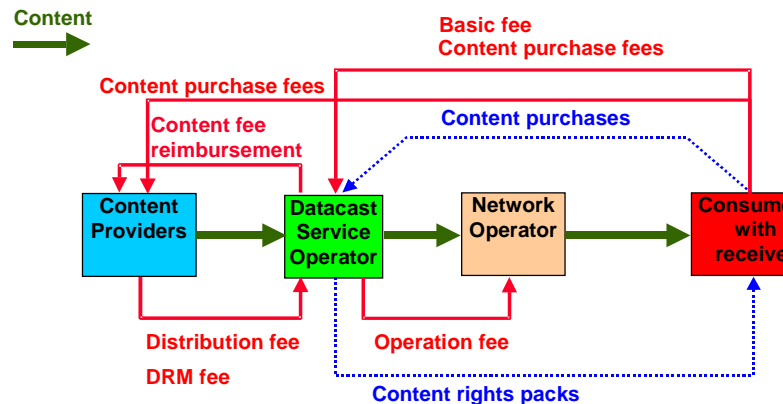
### **EARLY DAYS**

The Forum set itself two initial tasks. Firstly, it undertook a preliminary study of the potential business models for IP datacasting. Although each of the member companies, by definition, had envisaged some potential for IP datacasting services none had actually rigorously studied the issue. Secondly, the Forum undertook a similar technical study, highlighting areas where development may need to take

place to realise the envisaged services. The basic technical building blocks were known to exist in the realms of both internet and broadcast technology but what was needed was described as an ‘industry consensus’ on how overall systems could be implemented. To aid understanding of the new service ‘landscape’ two basic models were drawn up; a Datacast Business System and a Reference Technical Model. These gave the business and technical sub-groups a framework for further study activities.

### Datacast Business System

The Datacast Business System is shown in Figure 1. It depicts the ‘players’ in an end-to-end system and the potential revenue flows that may drive the business. Although appearing very simple in nature the conceptual system proved very



DRM = Digital Rights Management

Figure 1 : The Datacast Business System

useful for identifying key elements;

- § content providers; e.g. broadcasters, media houses, publishers
- § service operator; someone that aggregates content into a contiguous branded service
- § network operator; provides the delivery channel
- § consumer; uses and pays for the delivered content

Other important issues identified by the system are the need for security of content i.e. some form of rights management, and also the potential for several different billing methods and payment paths. The development of the model proved very useful in further study and, in particular, the formation of a Reference Service, as

we shall see later.

**Reference Technical Model**

The Reference Technical Model is shown in Figure 2. Like the business system it is essentially quite simple, but has proved to be a very useful tool for visualising

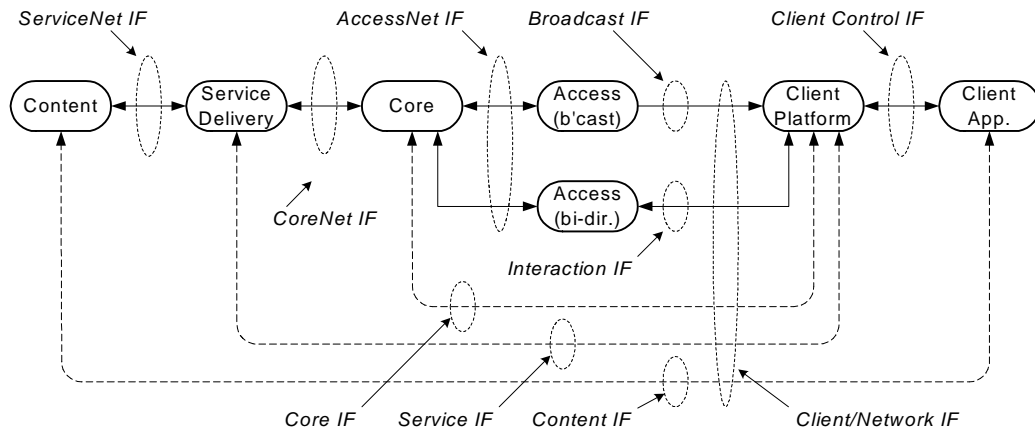


Figure 2 : The Reference Technical Model

requirements for further technical consideration. The model identifies all of the key system technical elements and the interfaces between them. A point to note is the existence of two access interfaces; a unidirectional broadcast interface and a bi directional telephony interface. The model is also useful in its depiction of the higher level interfaces that are required e.g. between the client application domain and the source content.

The availability of such a model facilitated another very important task, the development of the Baseline Specification, analogous to the client/network interface in this model. This will be described in more detail later.

**REFERENCE SERVICE**

During early studies it became clear that it was difficult to assess many technical and business aspects because of the wide range of potential services under consideration. We couldn't see the wood for the trees! It was therefore decided that a Reference Service should be defined, to provide a clear focus for study work. The technique



Figure 3 : Visualisation of the Reference Service

worked very well as even during consideration of the nature of the service, several issues were raised that may have otherwise been overlooked.

The Reference Service was defined as the delivery of video content to a handheld device, which provides 2G/3G and broadcast connectivity. A mockup of a consumer terminal for the service is illustrated in Figure 3. The secure telephony channel and billing mechanism are used by the consumer to request/purchase a range of 'graded' services. The chosen service example was the delivery of sports video coverage. The premium service offers live streaming using GPRS or 3G technology. This is essentially a one-to-one transaction, attracting a high fee. Less expensive options of the service use datacast technology to offer highlights or action replays at, or after, the conclusion of the sports event. This would require the terminal device to have sufficient storage to capture the content for later viewing. These non-real-time service variants would be offered for a reduced fee as it is much more cost-effective to broadcast the content only once to many users.

The Reference Service illustrates very well the complementary nature of telephony and datacast technologies. It also became apparent when considering the user experience that service presentation and discovery would be key elements of a datacast service. The consumer needs some form of service guide so that they are informed of the services available. Given that a wide range of services and content types are envisaged, the functionality of the service discovery mechanism is envisaged as an important factor to success.

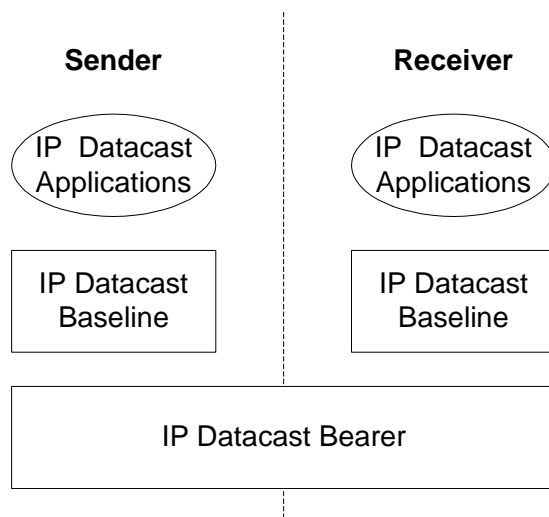


Figure 4 : Location of the IPDC Baseline

### IPDC BASELINE SPECIFICATION

The IPDC Baseline Specification is the most significant item of technical work yet undertaken by the Forum. The purpose of the specification is to define the minimum requirements for the interface of a terminal device to the access layer of the datacast network.

This is 'reflected' as the interface that a datacast application provider encounters at input to the bearer channel. This is illustrated in Figure 4. As noted

earlier the access layer of a network can consist of a unidirectional broadcast channel, a bidirectional telephony channel, or both. To cater for this the specification defines two profiles, a Broadcast Profile and an Interaction Profile. The Broadcast Profile is used for broadcast services, which are available without explicit user-initiated control and which function without any receiver feedback. The Interaction Profile is used for interaction services, which may require user initiated control and feedback from the receiver.

Detailed description the internet protocol layers employed by the Baseline Specification is beyond the scope of this paper. The following sections will, however, provide an overview of the layers required to implement broadcast and interactive datacast services.

### Broadcast Profile

The elements of the Broadcast Profile are illustrated in Figure 5. Two key application programming interfaces (APIs) are depicted as bold lines, termed A and B. API A is referred to as the IP Datacast Bearer API whilst B is the IP Datacast Baseline API. The Bearer API defines the interface between the data transmission medium and the user terminal device. The Baseline API is the 'socket' that IP Datacast applications interface with in the user terminal device. The interface with the bearer channel is implemented via the IP, IP

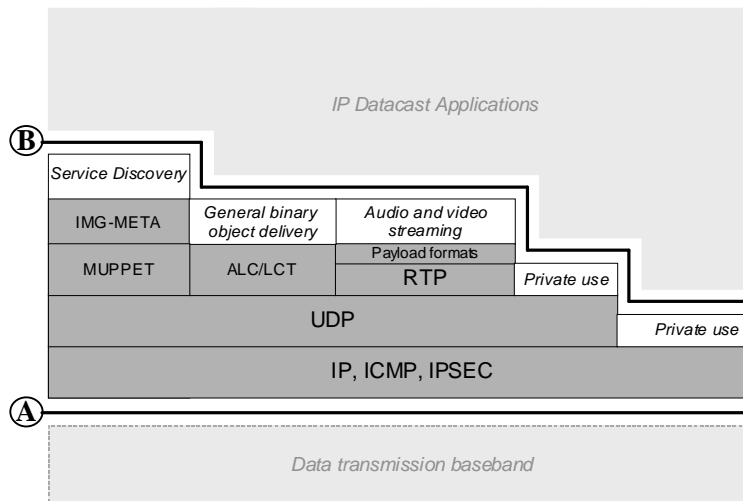


Figure 5 : IPDC Baseline Broadcast Profile

Security (IPSEC) and IP Control Message Protocols (IPCMP). These provide the fundamental framework for the transfer of packetised data in a secure manner. The layer above this, the User Datagram Protocol, provides the functionality for the transfer of larger datagrams, which form the basis of all delivered content. Above this layer the time-critical delivery of streamed content is facilitated by the use of Real Time Protocol (RTP) whilst object-orientated content uses the Asynchronous Layer Coding (ALC) and Layered Coding Transport (LCT) protocols. As indicated earlier a key aspect of providing datacast services is the provision of efficient service discovery mechanisms. This aspect is provided by the Media Guide Unidirectional Point-to-Multipoint Transport (MUPPET) and Internet Media Guide Metadata (IMG-META) layers.

### Interaction Profile

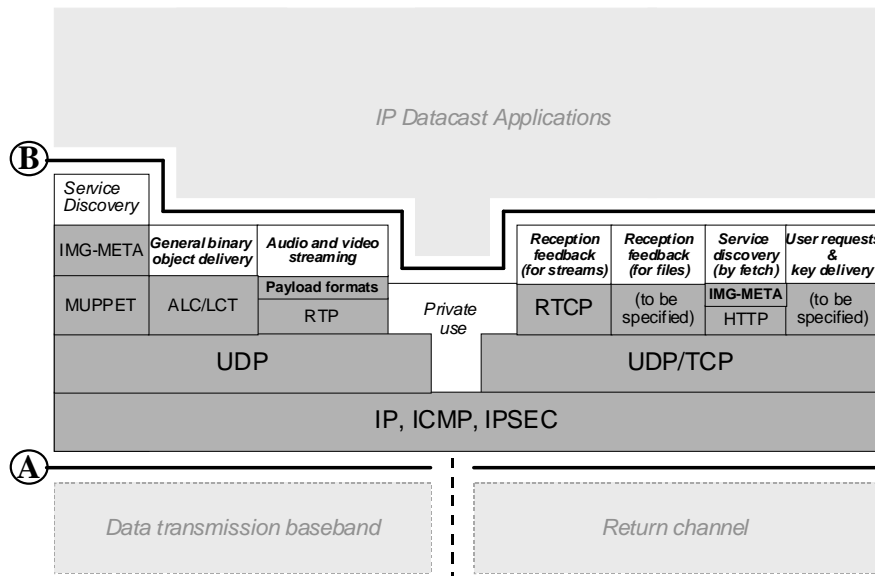


Figure 6 : IPDC Baseline Interaction Profile

The elements of the Interaction Profile are illustrated in Figure 6.

The 'forward' channel replicates that of the Broadcast Profile, as the requirements are identical.

The Interaction Channel differs by the addition of a return channel, which introduces the need for additional protocols. The RTP Control Protocol (RTCP) provides a return channel for the acknowledgement of reception of streaming media whilst the associated protocol for object delivery is, as yet, unspecified. Hypertext Markup Language (HTML) provides a channel for interacting with the service guide. The channel for the exchange of user requests is also unspecified at the time of writing. Clearly, for subscription services a secure method for user authentication, verification of correct content delivery and fee payment is essential. This complex area is not easily depicted in this diagram (essentially operating at the application layer), but is recognised as a major item of study work for future consideration.

## SUMMARY AND CONCLUSION

This paper has documented the formation and work of the IP Datacast Forum. Through the development of simple business and technical models the Forum discovered the need for clear service objectives, illustrated by the development of a reference service. Ensuing, and ongoing, work has undertaken the task of defining the necessary baseline interface specifications to support those service objectives. It is clear from this work that the emerging baseline specification needs to be more than just a 'broadcast internet' channel. Rather, it needs to be a carefully crafted subset of the wide range of available internet protocols designed to ensure secure, controlled delivery of content.

Future work of the Forum will necessarily study the functional requirements for terminal devices as well as proving the validity of the Baseline Specification through trial and demonstration. Another area that needs significant work is that of billing and payment, especially in a unidirectional broadcast service where delivery

of content cannot readily be verified.

1686