IMPLEMENTATION TPEG AND WEB SERVICES FOR DIGITAL RADIO

웹서비스를 적용한 TPEG시스템의 디지털 라디오 적용

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목 차

I. Introduction

For the past few years much work has been done in both the Digital Television and Digital Radio arenas to develop new types of service that will fully exploit the benefits of digital transmission. As part of its drive towards new services, the broadcasting station has been at the forefront of this work and this is reflected in the launch of several new types of service on both Digital Radio and Digital Television.

In the World, Digital Terrestrial Television (DTT) now should mostly offer the capability to deliver MHEG 5 based services, notably Digital Text participated earlier this year. Complementing this, the broadcasting station has also adopted two pilot data services on its Digital Radio platform: a TPEG service for providing Traffic and Travel Information (TTI) and an HTML based service analogous to BBC Digital Text. BBC Travel, the broadcasting station's TPEG service is the result of the work of the Transport Protocol Experts Group (TPEG) of Broadcasting Union every country, and is now entering a validation phase in preparation for full services. At the same time, Eureka and WorldDAB in Europe have provided the transport protocols to allow TPEG data to be carried using the Digital Audio Broadcasting (DAB) Digital Radio standard, as well as developing the Broadcast Web Site (BWS) application to the point where Radio can genuinely compete in a multimedia environment. Tracking the work of technical specification and standardization, These groups have developed the equipment and infrastructure required to effectively implement, manage and test these and future services. but, Nevertheless, These groups didn't considered how to apply web services based XML, not HTML based on text-oriented. we focused on how to apply relationship digital radio and web service using TPEG system. because digital doesn't just mean more services, It also means different services, Some of theses new types of service using Digital Technology will undoubtedly derive much from technology that has previously only been available from service such as web which is not mean internet.

The purpose of this study is to seeks to describe the developments in Digital Radio, focussing in particular on the development of the TPEG system for delivering Traffic and Travel Information and Web Services using the ubiquitous XML as a content format. We expect to apply efficiently for implementation TPEG and Web Services for Digital Radio in Korea

1. TPEG

The TPEG protocol was conceived by the EBU with a number of key goals in mind. The first, and most obvious, of these was to develop a protocol for delivering TTI and other information for the support of Intelligent Transportation Systems (ITS) in a rich and flexible manner. In addition to this, however, was the desire to create an open specification, free of Intellectual Property Rights (IPR) issues and license fee considerations, for a broadcast system that could easily be adapted to a wide

range of potential digital bearers.

As with any initiative aimed at developing new broadcasting standards, it was very important for the work of the TPEG project to have support from all appropriate industry sectors. Fortunately, TPEG has easily achieved this with involvement from information providers, broadcasters, map makers and, importantly, receiver manufacturers.

1) Digital Radio and TPEG

From its inception, the DAB Digital Radio standard was developed with mobile reception in mind. The combination of parameters for the Coded Orthogonal Frequency Division Multiplex (COFDM) modulation scheme ensure that a robust digital signal can be delivered to mobile receivers in a Single Frequency Network (SFN), which has been reflected in the network planning for the BBC s national Digital Radio multiplex. This suitability for mobile reception makes Digital Radio an ideal partner for a TTI service using TPEG since the question that needs to be answered is:

How do I get from where I am to where I want to be - given the state of the road network at this precise moment?

Part of this question can be answered by navigation systems and another part can be answered with positioning systems such as the Global Positioning System (GPS). The picture can only be completed, however, with an accurate and timely TTI service that can be delivered to where it is needed - i.e. to a vehicle.

2) Relating TPEG to other TTI protocols for Radio

An examination of the emerging market for navigation products that incorporate some form of TTI reveals a number of candidate protocols that could be used without re-inventing the wheel . In the UK and elsewhere, several commercial closed user group systems have been set up using GSM channels, but these are generally client-server

systems where a user terminal requests information. In such cases, the protocols rely on bidirectional communication and are not suitable for use in broadcast environments. A more promising avenue is the Traffic Messaging Channel (TMC)

application for the Radio Data System (RDS), which is part of many analogue FM radio broadcasts. Unfortunately, there are some obstacles that make it undesirable for some broadcasters to use a TMC based protocol for TTI in Digital Radio. TMC was developed to use a very narrow channel offered by FM/RDS where events are coded into 37 bit messages and one message can be sent per second. With such restrictions, the coding of TMC messages has had to be made extremely efficient but this has necessarily led to

several restrictions. One of the principle restrictions imposed on TMC is the need to use a location coding table in the receiver to allow a 16 bit location code to be converted into its geographical

representation. This leads on to the other problem with using TMC, as the location coding scheme involves the use of proprietary technology for which licenses must be paid. It is difficult for public service broadcasters like the BBC to support proprietary technology in this way, and the license

fee payable by receiver manufacturers has led to a very slow development of the receiver market. DAB Digital Radio has the potential to deliver bit rates that are orders of magnitude greater than those available with FM/RDS and so it was recognised that there was a need for a richer, more

flexible system for higher bit rate broadcast digital bearers such as Digital Radio. At the same time, a great deal of investment has been made in the development of RDS/TMC services and decoders. The TPEG project has sought to be as compatible with TMC as is possible, while at the same time making best use of the available bit-rate.

3) The basics of TPEG

While TPEG is generally aimed at delivering information to support ITS applications, there are a number of different classes of information that are being considered. This, combined with the desire to have a single TPEG stream be able to carry a variety of different types of information, potentially from a variety of service providers led to the concept of a TPEG multiplex. The need to be readily portable between different broadcast digital bearers suggested the use of a simple asynchronous stream format, and so a framing protocol layer for transporting TPEG data was developed, within which a multiplex of different TPEG services can be delivered. Recognizing the importance of supporting subscription services as well as free to air services, the framing protocol layer provides support for conditional access layers. Clearly, future navigation systems will be able to take information from a variety of sources, and it is important that TPEG is able to ensure that both public service broadcasters and commercial service providers

can compete in the normal way. Such an open market for

TTI guarantees that the overall winner will always be the end user.

4) The Road Traffic Message application

While it is intended that TPEG should ultimately support delivery of a wide range of types of information, the initial focus of the TPEG project was the ability to describe the state of a road network. As a result of this, the first TPEG application that was developed was the Road Traffic Message (RTM) application. Within the RTM application, a carousel of messages is broadcast where each message describes an event on the road network. For example, a message might describe an accident, road works or even escaped animals! Each message can be tagged with an expiry time and a version number which can be used to ensure that receivers always maintain an up to date record of all messages.

5) A hierarchical approach to event coding

A great deal of TPEG s flexibility derives from the use of a hierarchical event coding scheme that allows a variable level of detail to be used with the RTM application. This is extremely useful for three reasons: First, it allows receivers to easily filter out the information that is appropriate to the receiver implementation. Second it allows service providers
to trade off detail level against number of messages or bit rate, which allows the RTM application to scale well according to the size of the channel. Third, it makes content generation simpler as more levels of detail can be supplied as more information becomes available. For example, when an accident occurs, the first reports received by a TTI provider will probably enable them to say that an accident has occurred at a particular location. Quarter of an hour later, the TTI provider may know more about the incident and so can add further detail to the RTM event description that indicates that the accident involved a two vehicles.
Later still the TTI provider may know enough about the incident to say that the accident involved a bus, an articulated lorry and a deer and that the lorry is now blocking all 6 lanes and there is a 10 mile tailback. While the hierarchical coding structure is not something that is common to RDS/TMC, the basic data dictionary for describing events is the same. This means that there should be a high degree of compatibility between origination systems for TMC services and origination systems for TPEG. For example, although the actual coding of information about vehicles is different, the concept of a heavy goods vehicle and trailer is common to both and has the same semantic definition in both.

6) A universal coding scheme for location coding

Another important feature of the TPEG RTM application is the use of a location coding scheme that is independent of any proprietary mapping system. The TPEG RTM application uses the concept of Intersection Location (ILoc) codes to represent locations which consist of a longitude and latitude, together with up to three 5 character strings giving the first 5 characters of the names of the roads that define the intersection. Using longitude and latitude allows the coordinates of the location to be easily transformed to any desired coordinate system. The three road names make it easy for navigation systems to precisely locate the incident when there are minor discrepancies in the map database, due to the resolution or quality of the map data.

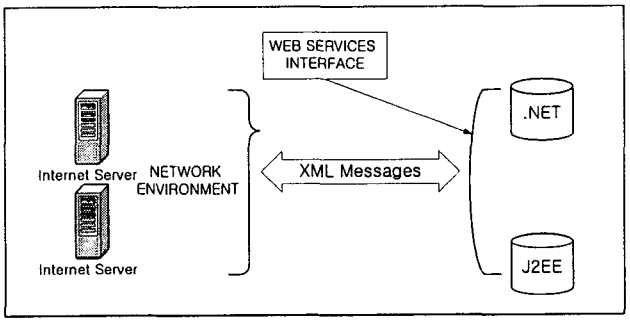
II. APPLICATION FOR TPEG AND WEB SERVICES

1. Validating TPEG and web services

For the broadcasting station, TPEG is ideal. An example, The Travel unit currently deals with up to 1200 events in the UK road network, with many information sources ranging from police control rooms to the general public. The output from the travel unit takes a number of forms - Internet, Teletext and, naturally, scripts for radio and television travel bulletins.
Radio is the only way to deliver this to a vehicle but radio travel bulletins are necessarily limited to a tiny fraction of the total information available. Out of the 1200 or so events that are known about, only 4 or 5 will be mentioned in each bulletin. By delivering all of the content directly to mobile receivers in a form that can be interpreted electronically, TPEG allows the broadcasting station to provide a valuable public service based on content that we already own.
With such compelling arguments in favour of using TPEG with Digital Radio, we focused how to decide to launch a pilot TPEG service with three basic aims in mind:

- To gain experience with using TPEG
- To promote and validate the TPEG standard
- To allow receiver manufacturers access to a stream of TPEG data for development purposes. The pilot TPEG service has been running since early February and uses

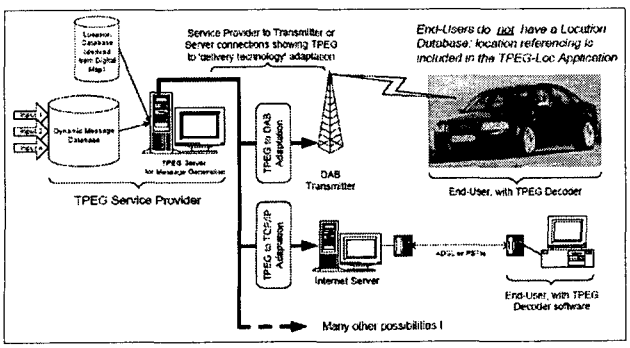
live content generated by the Travel Unit to create a TPEG stream that is both broadcast using Digital Radio and accessible over the Internet. The provision of the Web Services provide the bearer independence of TPEG and also allow receiver manufacturers to develop TPEG decoders against the service. Simply providing a stream of TPEG data is useful for developers but does not demonstrate the capabilities of the protocol. In order to overcome this, we proposed an example TPEG receiver that has been written in J2EE and NET. The receiver shows a variety of ways in which the TPEG service can be used, including showing the events on a map. Writing the receiver in Java means that it can be delivered as part of a normal web site for decoding the Internet version of the service, as well as being used to decode the Digital Radio service. To' connect TPEG service, we shows that Web services wrap, presenting to the network a standard way of interfacing with ,NET and J2EE in Figure 1. web services interfaces receive a standard XML message from the networking environment.



<Figure 1> Web services interface with back-end systems

2. How to apply TPEG System and Web Services

The TPEG Specifications for TPEG system are desinged to allow and existing Service Provider(eg RDS-TMC), to migrate towards the Web Services age by employing the TPEG Specifications to achieve the delivery of several services. Figure 2 shows a TPEG system, showing possibilities to connect the web services interface.

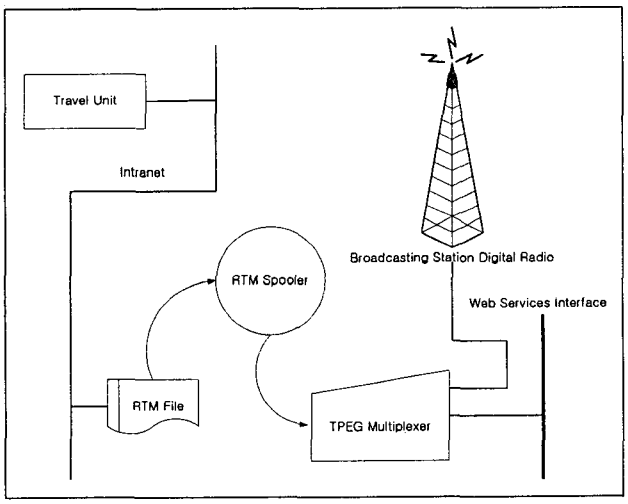


<Figure 2> A TPEG system

In our research, we presented the relationship internet server and Web services interface using XML messages in fig. 1.

A TPEG system should be adopted to internet server through the TPEG to TCP/IP Adaptation.

The TPEG service can start with Travel Unit on the seventh floor of broadcasting station's Centre where events on road network are collated into a single database. This database is capable of supporting all of the Travel Unit s outputs and, in particular, can generate a file representation of the complete database as TPEG RTM messages. This RTM file is transferred to the Digital Radio system at Broadcasting House across the broadcasting station Intranet using network or FTP. Whenever a new RTM file is transferred, the TPEG software for the Digital Radio system reads the new content and spools it into a TPEG multiplexer . The output of the TPEG multiplexer is a complete TPEG stream that is fed to both the Digital Radio equipment and the web services interface. The general arrangement is shown in Figure 3.



<Figure 3> Implementation TPEG and Web Services for Digital Radio

3. Plans for the future

The TPEG project is continuing to develop new applications for the TPEG protocol and will soon have completed the specification a Service and Network application in addition to the RTM application. The Service and Network application will allow the TPEG stream itself to be completely described, including information to allow service

following between different TPEG bearers. Once this work has been completed, work is already in preparation to define and application for describing public transport

networks to complement the RTM application.
All of this future work will continue to maintain the central ideas of an open, license free specification together with rich and flexible structures for describing problems with the various transport networks.

III. CONCLUSIONS

With the emergence of digital broadcast technology, we are coming to be familiar with the idea that digital doesn't just mean more services, it also means different services. Some of theses new types of service will undoubtedly derive much from technology that has previously only been available from web, while other 'data' services can be foreseen that will allow high value information to be integrated directly into other systems.
Considerable work has been done by the broadcasting station to exploit these opportunities for both Digital Radio and Digital Television. The purpose of this study is to seeks to describe the developments in Digital Radio, focussing in particular on the development of the TPEG system for delivering Traffic and Travel Information and Web Services using the ubiquitous XML as a content format. We expect to apply efficiently for implementation TPEG and Web Services for Digital Radio in Korea

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