Case Studies on New Services and Applications

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Abstract

The Eureka-147 DAB system provides a reliable digital broadcast service in excess of 1.2 Mbits/s. It is also suitable for mobile besides portable and fixed radio receptions. Its robust, high spectrum- and power-efficient technology makes it an ideal system for both audio and data transmissions. This paper discusses some of the interesting case studies on the new services and applications by leveraging on the strength of DAB - bringing it beyond its traditional role in audio broadcasting.

1.0   INTRODUCTION

SmartRadio – a digital radio service from MediaCorp Radio Singapore, was launched on 19 November 1999. Based on the Eureka-147 DAB standard [1][2], it is the first commercial digital radio service in Asia. A reliable digital broadcast service that provides a bandwidth in excess of 1.2 Mbits/s, the Eureka-147 DAB is also an excellent system for portable and fixed as well as mobile radio receptions. Its robust, high spectrum- and power-efficient technology makes it an ideal system for both audio and data transmissions.

With merely six audio stations from MediaCorp Radio's FM services at the beginning, SmartRadio now offers a total of fourteen audio services, of which six are exclusive DAB stations while the rest are FM simulcasts. SmartRadio also provides timely and up-to-date information in easy-to-read text and graphics on its PAD (Programme Associated Data) & NPAD (Non-Programme Associated Data) services [9][4]. PAD, which is used to convey information together with the audio programme, form part of the digital audio bitstream with a variable capacity from 667 bits/s to 65 kbits/s. Song title, artiste's name, and traffic update are available on SmartRadio's PAD-DLS (Dynamic Label Segment) service. These appear as scrolling text display on every LCD screen of a DAB radio. There are also slideshows on SmartRadio's PAD-MOT (Multimedia Object Transfer) service which accompany each and every of its fourteen audio services. These slides present news headline in text and graphics, pictures of artistes, upcoming events, DJ's photos, and other media trivia. Organised in a fashion that is similar to a website browser, the dedicated NPAD service on SmartRadio offers news in text and pictures, traffic update in the form of snapshot showing the traffic condition on the expressway, weather report, airport flight information and even lottery results, among many other information. These information are culled automatically from the various websites, re-purposed using a proprietary software program before transmission via the DAB network.

The introduction of digital radio is strategically necessary for radio broadcasters to grow audiences and develop new business opportunities. As the leader of the radio industry in Singapore, MediaCorp Radio continues to pursue new and innovative business opportunities by leveraging on the strength of the Eureka-147 DAB [5][6][7]. This paper discusses some of the interesting case studies on the new services and applications based on DAB technology beyond its traditional role in audio broadcasting. Section 2 below highlights some of the projects developed in Singapore that has interesting applications for public transportation,

education, outdoor advertising, financial services, and even emergency message broadcasting.

2.0   BEYOND RADIO IN DAB

The Eureka-147 DAB channel capacity can be utilised for new services beyond traditional radio broadcasting application [8]. This section highlights some of the projects developed in Singapore that include RadioDigital Mobile (RDM) and Mr TaxiSmart for public transportation, Project Socrates for education, eBillboard for outdoor advertising, Project SCDF for the broadcast of emergency messages, and DAB-IP for financial services.

2.1   RadioDigital Mobile (RDM)

RDM integrates GPRS with DAB [9], providing a return path for interactivity as shown in Figure 1. A DigiCube acts as an integrated DAB gateway and has a DAB receiver and a GPRS transceiver installed. The DigiCube communicates with the DigiPads via the IEEE 802.11b wireless LAN (Local Area Network) connection. A picture of the DigiPad is shown in Figure 2. RDM enables passengers travelling on public transport such as taxis, buses and trains, to subscribe to a variety of information channels and value-added services as shown in Figure 3. It is able to support high bandwidth multimedia applications on the DigiPads that includes listening to MP3 music or viewing videos, email, web browsing, traffic & weather reports, e-news, e-street directory, e-shopping and even e-games. RDM does not restrict users to the DigiPads alone. It is a flexible system which can accommodate other wireless devices such as PDAs, mobile phones or even notebook computers as long as they are able to establish a wireless LAN connection with the DigiCube. The link between the wireless device and the DigiCube can also be replaced with other transmission platforms such as Bluetooth. With RDM, travelling on the road around the island nation is a much more pleasant, exciting and informative experience. RDM can also be easily extended for military as well as civil defence applications without compromising security by incorporating CA (Conditional Access) technology.

2.2   Mr TaxiSmart

Unlike Mr Taxi, an earlier model that was in a trial involving 200 taxis in Singapore as shown in Figure 4, Mr TaxiSmart is an improved model that incorporates DAB [10]. A standalone device, Mr Taxi is a hard disk based system that requires the swapping of its hard disk for updated information on a monthly basis. Imagine the lost time which could be translated as a direct loss in revenue and not to mention the need to perform the laborious swapping task which can be rather unproductive. As shown in Figure 5, Mr TaxiSmart offers up-to-date information that is downloaded via the DAB network. Commuters get to enjoy infotainment such as the latest news, shopping sales, airport flight details, places of interests, and many more on an LCD screen besides the free-to-air digital radio service from SmartRadio.

2.3   Project Socrates

The technology behind Socrates [11] is an extension of RDM which demonstrates an efficient wireless data transmission platform using DAB. Socrates brings learning out of the classroom by providing students with an easy-to-use tool in field trips using MoWiG (Mobile Wireless Gateway) and notebook computers as shown in Figure 6. The MoWiG acts as an integrated DAB gateway and has a DAB receiver and a GPRS transceiver installed. As shown in Figure 7, the MoWiG is a portable battery-operated device that communicates with the notebook computers or any other handheld device such as PDAs via the IEEE 802.11b wireless LAN

connection. Students and teachers can communicate in real-time using web chat with their notebook computers and also to those who are logged onto PCs in school or at home. Bulky information such as report document or JPEG files can be transmitted via DAB. Unlike using Bluetooth or wireless LAN, students are not restricted to within the vicinity of their school compounds. With Socrates, students in Singapore can access information almost anywhere for any outdoor assignments.

2.4   eBillboard

Using DAB to deliver stills can be as powerful an advertising message as moving pictures. Large-sized stills can be delivered via DAB NPAD service at 128 kbits/s as shown in Figure 8. There are several advantages in using DAB to deliver large-size stills to plasma screens against the conventional poster or scrolling screen method. First of all, it is logistically simpler since DAB can broadcast to multiple locations simultaneously instead of manually changing posters at every location. Secondly, real-time updates are also possible. Thirdly, the use of advertising space can also be easily optimized in terms of a slideshow with the flexibility to control the rotation time and sequence. Finally, it can generate a livelier and eye-catching advertising display.

2.5   Project SCDF

In the event of any likely threats or national disasters, the Singapore Civil Defence Force (SCDF) has remote access from its headquarters and override SmartRadio's DLS service for the broadcast of its emergency text messages via MediaCorp Radio's DAB network as shown in Figure 9. Future extensions include a DAB-based Public Warning System (PWS) for the audio siren broadcast island-wide.

2.6   DAB-IP Financial Service

With the proliferation of Internet-based devices such as the computers, PDAs, and even mobile phones, DAB data can be encapsulated using the IP (Internet Protocol) standard. This further enhances DAB's flexibility and extends its applications for several new and innovative services. Comparing with the other video formats, a DAB-IP based video channel requires a much lower bandwidth. In the case of BT Movio [12], each video channel is encoded at 64kbits/s to 128 kbits/s based on the Windows Media Player 9 (WMP9) format. goMobile Pte Ltd, a software technology company in Singapore, has developed a DAB-IP based financial service offering a suite of information options in text, graphics and even video.

3.0   CONCLUSION

Digital radio can be extended to include text and multimedia data services such as song title, artiste's name, traffic report, slideshow and even video. In fact, almost anything that can be digitized can be transmitted over the digital radio platform. With digital technology, it has the potential to offer many interesting new services and applications beyond radio broadcasting.

Some new services and applications based on the Eureka-147 DAB technology were presented. RDM, an integration of GPRS and DAB that provides a return path for interactivity, enables passengers travelling on public transport to subscribe to a variety of information channels and value-added services. Mr TaxiSmart offers up-to-date information that is downloaded via DAB. With this device installed in a taxi, commuters get to enjoy infotainment such as the latest news, shopping sales, airport flight details, places of interests,

and many more on an LCD screen besides the free-to-air digital radio service from SmartRadio. Socrates, an extension of RDM, brings learning out of the classroom by providing students with an easy-to-use tool in field trips. Unlike Bluetooth or wireless LAN, students are not restricted to within the vicinity of their school compounds. With Socrates, students in Singapore can access information almost anywhere for any outdoor assignments. In eBillboard, one of the many advantages is its ability to allow near-instantaneous and simultaneous update of large-size stills on plasma screens instead of manually changing posters at every location for the conventional poster or scrolling screen method. Project SCDF allows the broadcast of emergency text messages via PAD-DLS service and can be easily extended for audio siren broadcast island-wide. And in DAB-IP service based on the Internet protocol, it has the potential to offer a suite of financial services in text, graphics and video at a very low cost.

Digital radio broadcasting will continue to dominate as a more efficient and cost-effective means of reaching its audiences. It will evolve into a hybrid system by integrating DAB with telco technology for interactive mobile receivers, and with the Internet for interactive home receivers. Digital radio will continue to serve radio listeners who enjoy higher sound quality and provide an efficient, robust and cost effective wireless delivery platform for mobile multimedia applications beyond radio [13].

4.0 REFERENCES

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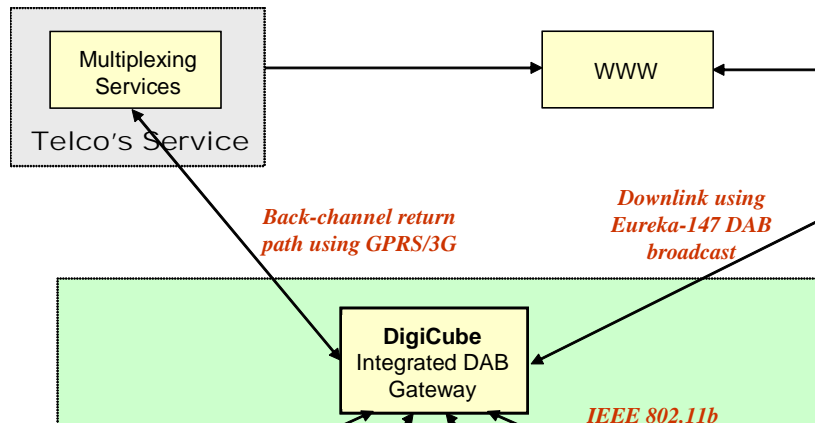
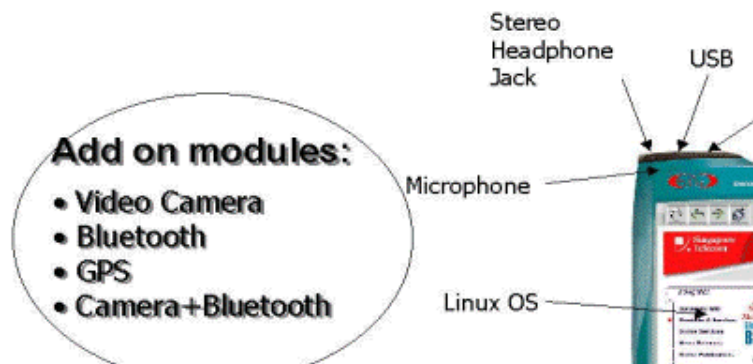*Figure 1 – Block diagram of the RadioDigital Mobile (RDM)*

Figure 2 – Photograph showing the various parts of a DigiPad. Small and relatively lightweight, it has a colour LCD

Figure 3 – *Photograph showing the concept of wireless
infotainment service using PDM*

Figure 4 – *Photograph showing a commuter accessing*

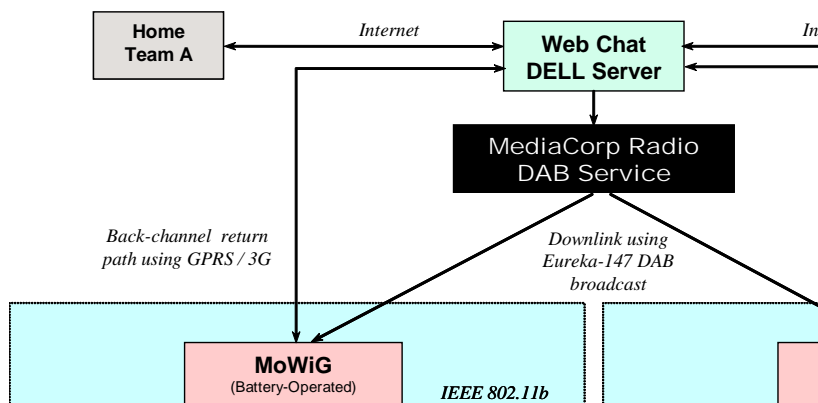***Figure 5*** *– Photograph showing Mr TaxiSmart - an integrated*

Figure 6 *– Block diagram of the RDM system for educational*

Figure 7 – Photograph showing prototype device of a

Figure 8 – Photograph showing a plasma screen displaying an image that was transmitted via SmartRadio's DAB network
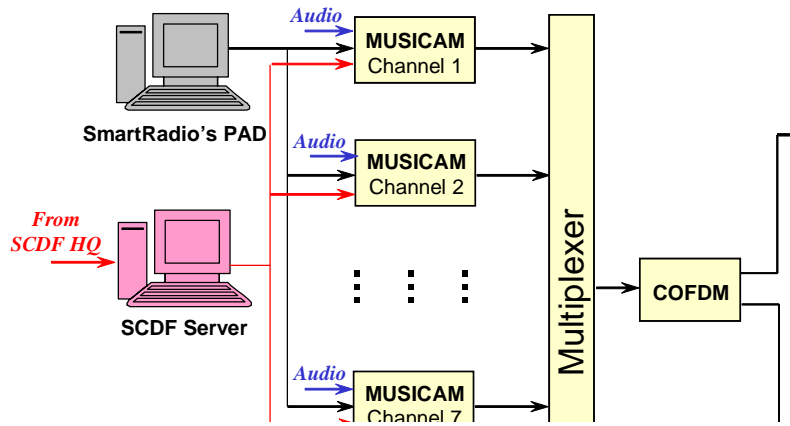
Figure 9 – *Block diagram of the SCDF DAB-DLS emergency*