Mobility/Portability in ISDB-T

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1. Brief Technical Description of Mobility/Portability in ISDB-T

1.1 Technologies for Portable Reception

(1) Segmented Transmission and Partial Reception



What is "Segmented Transmission and Partial Reception

Image of "HDTV + One-seg" in same bandwidth



*13 segments are divided into layers, maximum number of layers is 3.

*Any number of segment for each layers can be selected (totally 13 segment)

*Transmission parameter sets of each layer can be set independently (In above example, modulation index of each layer are different)



Summary

•For partial reception, signal processing speed is reduced to 1/8 of wideband reception (6MHz full band)

•Therefore, power consumption is extremely reduced.

•Of course, video/audio signal speed is also very low compared to wideband reception service.

•As a result, portable receiver is realized.

(note) DVB-H system adopt "time slicing" technology, time division multiplexing of video/audio data. But, demodulation portion is same as DVB-T(wideband reception), so, power consumption of demodulator is not reduced.

(Product example of Demodulator LSI)

1 seg OFDM Demo.& FEC ETC90521

Concepts of development

- Smaller die size by using 90nm process.
- Successions of the technology of TC90501.
 - Low power consumption.
 - All demodulation circuits are implemented by hardware. (No host operation is needed except initial register settings by I2C.)
- Technology improvements from TC90501
 - Performance of mobile reception.
 - High speed channel changing.

Functions

- Partial reception of digital terrestrial television.
- 1 segment reception of digital terrestrial radio.

Supply voltages

- Logic/Analog :1.2V, I/O:1.8 to 3.3V

Package

– Bare chip





1.2 Technologies for Mobile Reception (1) Time Interleave



Effect of time interleave

Example of Test Result for Time Interleave

How much improved by using Time- Interleave

Following graph shows degradation by impulse noise, which is dedicated by Mackenzie Presbyterian University measured in Autumn , 2005



Pulse Width [µs]

- ATSC Latest Generation 19.39Mbps-8 VSB 2/3
 DVB Latest Generation 19.3Mbps-64QAM 8k 3/4 1/16
- width [µs]
 - ATSC Previous Generation 19.39Mbps-8 VSB 2/3
 DVB Previous Generation 19.3Mbps-640AM 8k 3/
- ---- DVB Previous Generation 19.3Mbps-64QAM 8k 3/4 1/16
- ---- ISDB Previous Generation 19.3Mbps 64QAM 8k 3/4 1/16 0,2s

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(2) Diversity Reception Technology





Block diagram of 4 Diversity Reception System



(note) this data is dedicated by NHK laboratory

Example of Field Test Result for Diversity Reception

(Product example of Demodulator LSI)

(3) 4-branch Diversity OFDM TC90504IXBG

Concept of development

- 4ch diversity reception
 - Built-in 4ch ADC and 4ch FFT circuit
- High performance at the mobile reception
 - Combining 4ch FFT output
- Small Package
 - 13x13mm BGA package

Integrated design

- Built-in DRAM for de-interleave
- CMOS 90nm embedded DRAM
- Feature
 - Wide(13seg) and narrow(1,3seg) band reception
 - Partial reception
- Power Supply
 - Logic :1.2V(typ.)
 - Analog :2.5V(typ.)
 - I/O :3.3V(typ.)
- Package
 - PFBGA177-1313-0.89
- Temperature range

TOSHIBA 20 to 85 degC

Leading Innovation >>>

Under Mass Production



2. Product Examples

2.1 Examples of Mobile/ Portable Receiver in Japanese Market



Fixed Receivers



Fixed Receivers(Cont.)





Fixed Receivers(Cont.)



In-car Receivers



Portable Receivers



Portable Receivers(Cont.)

One-Seg Only



3. Introduction of Mobile Application

3.1 One-Seg service

3.2 HDTV mobile access

3.3 Emergency warning system

One-Seg service (1)

One-Seg is abbreviation for "one segment service".

- □ One-Seg launched on April 1,2006 .
- More than 8.4 million receivers were shipped according to JEITA statistics of Jul.2007.



One-Seg service (2)



 Video (H.264) *approx.* 180-256kbps
 Audio (AAC-SBR) *approx.* 32-64kbps
 Data-cast (BML) *approx.* 20-80kbps

One-Seg service (3)

Example of business models

UTV shopping

The service enables viewers to purchase commercial goods shown on shopping program.

Local service

The service can provide local information such as emergency alerts, local events, notice from local government or hospital.

Coupon ticket

Service enables to get coupon tickets such as grommet ,movie, book.

DAdditional information service

The additional information linked to on-air programs are supplement service such as information on athletes and celebrities, recipes, questionnaire and answer to a quiz.

HDTV mobile access (1)

HDTV can be watched even in a moving vehicle, by using space diversity technology.





HDTV mobile access (3) Comparison test on HD mobile access



HDTV mobile access (4)

HDTV tuner for automobiles is now on sale.





Digital terrestrial television broadcasting tuner for automobiles

LCD for automobiles

High quality image wide-LCD panel. Faithful reproduction of DVD and digital terrestrial television broadcasting image

HDTV mobile access (5)

HDTV tuner for automobiles is now on sale.





Emergency Warning System

Emergency warning system (EWS) is to transmit the disaster information such as alert sound and activation signal to public via television OA wave.

EWS has been operated since September 1985 in Japan.



4. Investigation for future Mobile Multimedia services

4.1 One-Seg service in a subway car4.2 ISDB-T mm

One-Seg service in a subway car (1)

SFP (Subway Filling Project) is organized by 6 major broadcasters, Hitachi, Panasonic, Sanyo and Tokyo Metropolitan Subway. SFP carried out a One-Seg access test in a subway car on the underground tunnel in March 2006.

One-seg service in the subway car is beneficial for passengers due to receive emergency information in the case of disasters.



One-Seg service in a subway car (2)

Two methods to receive One-Seg broadcasting

Deployment of multiple re-transmitters

Laying LCX, leakage coaxial cable



One-Seg service in a subway car (3)

Conceptual diagram on the test methods



One-Seg service in a subway car (4)

Conclusion

□More than 80% of reception rate was accomplished with re-transmitters with the power of less than 1W located 300m intervals through the tunnel.

□The method of multiple re-transmitters is cheaper than the method of LCX.

Wide spectrum of 1ch-12ch in VHF band and 53ch-62ch in UHF band will be vacant due to termination of analog broadcasting service in 2011.



Japan is now under study on beneficial use of vacant spectrum band such as 70MHz of VHF band and 60MHz of UHF band.

ISDB-Tmm, mobile multi-media, is one of powerful proposal for new spectrum band.



Feature of ISDB-Tmm

- Based on ISDB-T
- Flexibility of payload band width
- All segments are enable to be assigned for mobile use
- New media for Multi-Channel Streaming and Download Pay Services



13 segments(6MHz)

ISDB-T mm ISDB-Tmm service category



ISDB-T Mobile Multimedia Forum

- Driving force to develop ISDB-Tmm system
- After switch over of analog terrestrial, Forum expects some spectrum to be assigned for new mobile DTT service.
- Over 60 companies are joined ISDB-T MMF
- Established Dec. 21st 2006.

ISDB-T MMF Members

steering board members

Fuji Television Network, Inc.

NIPPON TELEVISION NETWORK CORPORATION

TOKYO BROADCASTING SYSTEM, INCORPORATED

ITOCHU Corporation

Sumitomo Corporation

SKY Perfect Communications Inc.

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TV Asahi Corporation

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Obrigado

Thank you for your Attention!

Domo Arigato Gozaimashita

<u>Digital Broadcasting Expert Group (DiBEG)</u>

In ARIB (Association of Radio Industries and Business)

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