

ISDB-T technical seminar(2007)
in Argentina

Seminar #7

Outline of Service/ Receiver/Facility of Broadcaster

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Digital Broadcasting Expert Group (DiBEG)

Japan

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(Toshiba)

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2. Current Service in Japan
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 - Part 2 Transmitter and Transmission Network System

1. Service Configuration of ISDB-T

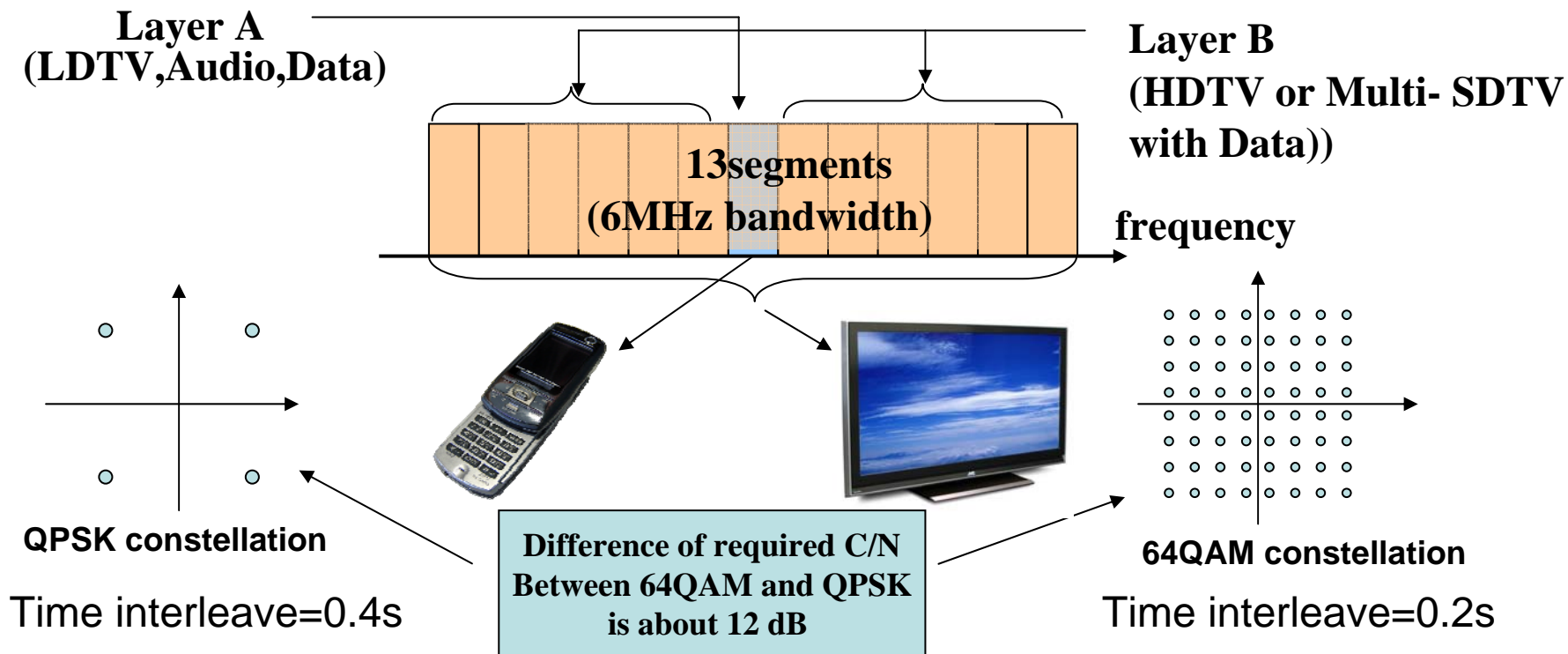
As explained in forward seminar, ISDBT has a priority for service variation by making use of its hierarchical transmission technology.

At first, show a relations between service type and hierarchical transmission system

Image of ISDB-T transmission system performance

Transmission system; Segmented OFDM with Time interleave

(Example; 1seg + 12 seg)



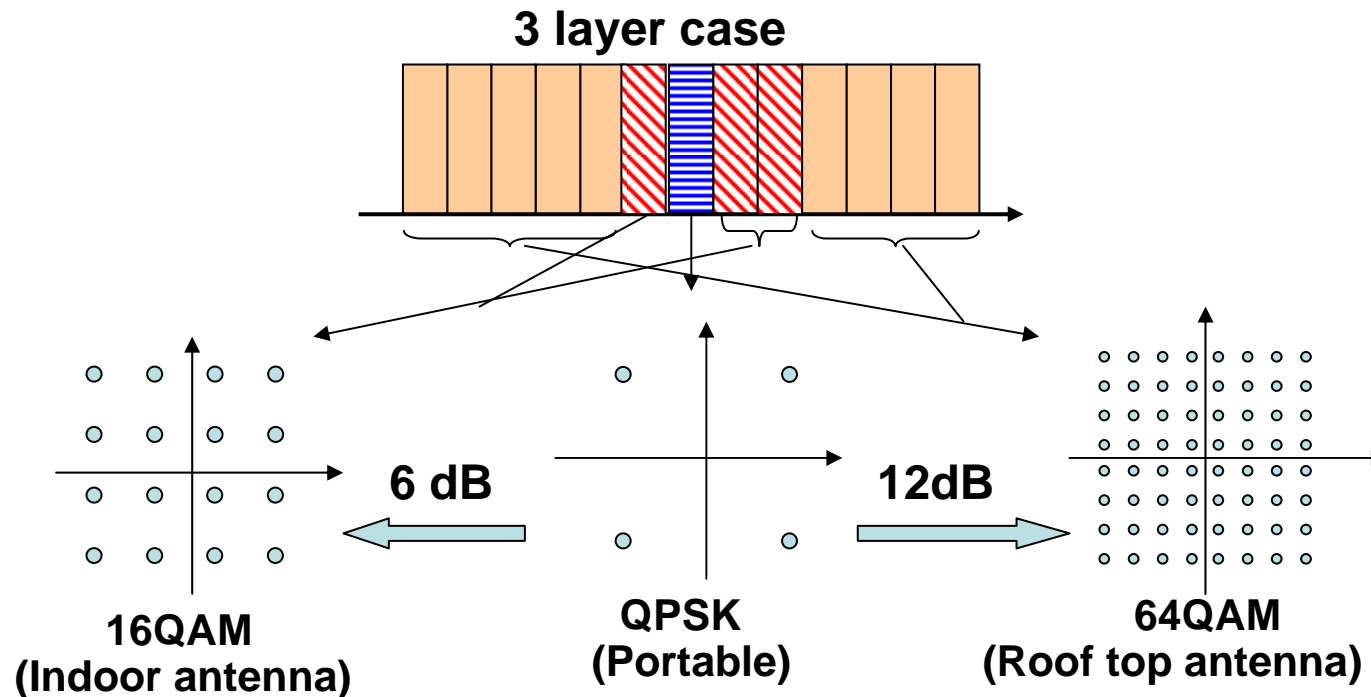
*13 segments are divided into layers, maximum number of layers is 3.

*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)

Examples of Hierarchical transmission system

- Hierarchical transmission

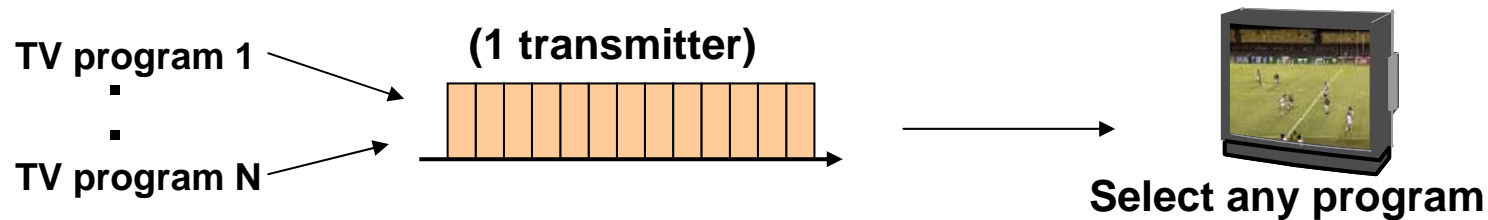


As shown above, ISDB-T transmission system supports maximally 3 reception style.

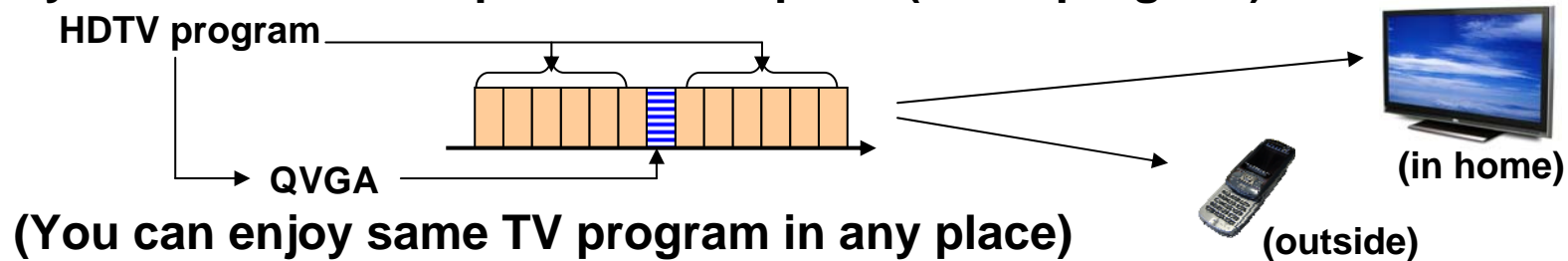
Therefore, any of transmission system can be arranged according to the service concept in one frequency channel and one transmitter

Examples of Service Configuration of ISDB-T

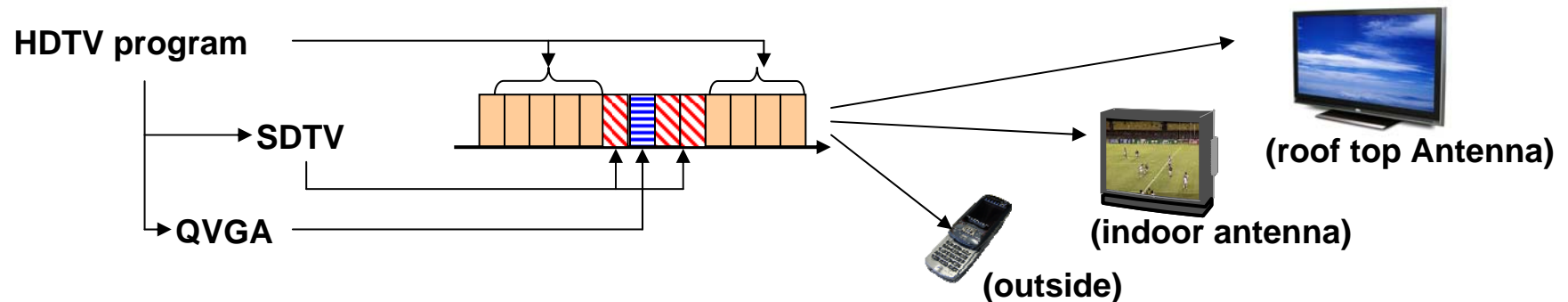
(1) Single layer multi-program for stationary reception



(2) 2 layers for HDTV and portable reception (same program)



(3) 3 layers for HDTV , SDTV and portable reception (same program)



Current service in Japan is case (2) shown above.

2. Current Service in Japan

As described in forward page, Japanese Broadcasters adopt “1 + 12” service.

1 segment (Layer A) is used for mainly for portable reception ,named “One Seg service”, other 12 segments (Layer B) is used for fixed reception service.

In this section, examples of service are introduced.

Part 1; Examples of fixed reception service

Service lineup of ISDB-T in Japan

ISDB-T has powerful applications

HDTV



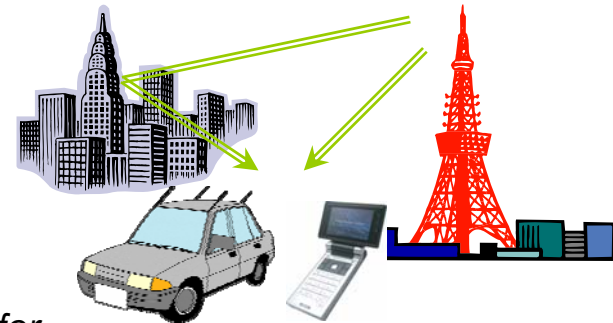
- High quality image on wide screen and CD quality sound.

Data broadcasting



- Local news and weather forecast for viewers at any time.

Mobile accesses



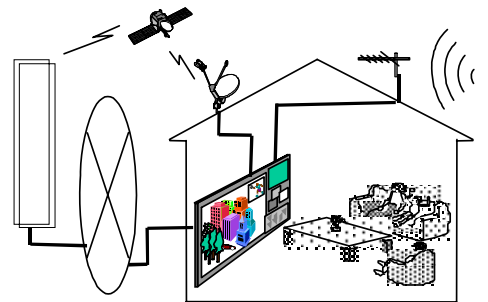
- Transmission service to Mobile accesses

Multi-channel program



- Standard quality multi-channel service

Interactive TV



- Offers Interactive service

Examples of fixed reception service

□ High Definition Television Program

- ✓ The high quality images on a 16x9 wide screen and CD-quality sound make you feel as if you were at the theater.
- ✓ European broadcasters have opted for “multi-channel” strategy, but Japanese broadcasters have chosen to take advantages of “high definition” pictures.
- ✓ HDTV is a killer application.



Examples of fixed reception service

Multi-channel SDTV program service

□ISDB-T can transmit multiple SD programs simultaneously on a single digital spectrum.



SD-1



SD-2



SD-3

Maximum number of Channel is 8 defined in Japanese ISDB-T

Examples of fixed reception service

Data broadcasting (1)

□ Data broadcasting is an additional service.

■ By clicking on d-button of a remote control unit, you can access your requested information such as local weather forecast, 24H news and information linked to on-air program.

□ Basic page format

Present time and date
Today's recommendation
Weather forecast
News
Fortune-telling service

Local weather information

News banner

TV station ad banner

The screenshot shows a news program with two anchors. A 'd-menu' overlay is on the right, listing: 'tv asahi d-menu', '09月05日 (月) 18:00', 'イチオシ!', 'お天気情報' (with an up arrow), 'ANNニュース', 'テレビ朝日を含む全国26局が発信するニュースです', 'やじプラ占い' (with a down arrow), and 'ご利用の方へ'. At the bottom, there's a '今日の天気' (Today's Weather) section for '東京都港区' showing a high of 12°C and a 30% chance of rain. Below that is a 'ANNニュース' banner about Prince Charles's wedding. At the very bottom is a '報道 STATION' banner with the TV Asahi logo.

Data broadcasting (2)

■Program-linked contents

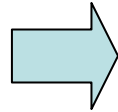
Information service linked to on-air programs

Accessible during on-air

On-air program



Click on
d-button



Basic page format



Linked data page format



Click on
a program title



Contents
Menu



Data broadcasting (3)

■Non-linked contents

Information service not linked to on-air programs

Accessible any time



Today's recommendation



Weather forecast



News



Fortune-telling service



Examples of fixed reception service

□ EPG (Electronic Program Guide)

■ An Electronic Program Guide (EPG) is an interactive schedule of current and upcoming programs that a viewer can display on-screen simply by pressing a button on his remote control unit.



Part 2 Examples of Portable/Mobile Reception Service

One-segment reception Service in ISDB-T system is very unique and special advantage in the World!

Worldwide Trend of Mobile Digital TV Reception

Importance of mobile reception is recognized worldwide.

Europe and U.S.A developed **additional system** for mobile reception.

Broadcasters need **additional investment** for mobile TV reception **except in the case of Japan's system.**



EUROPE

Mobile Reception: DVB-H
Fixed Reception: DVB-T

- DVB-H was established for mobile reception as series of DVB, European DTTB system.
- Trial Services have been provided in some countries, such as Finland, France, Spain, and Denmark.
- ✂ *MPEG-4 AVC/ITU-T H.264 will be adopted for video encoding.*



KOREA

Mobile Reception: T-DMB
Fixed Reception: ATSC

- T-DMB based on European Digital Audio Broadcasting (DAB) was adopted for mobile reception systems unlike fixed reception.
- Launched in Dec. 2005
- ✂ *MPEG-4 AVC/ITU-T H.264*



JAPAN

Mobile Reception: ISDB-T
Fixed Reception: ISDB-T

- MPEG-4 AVC/ITU-T H.264 was adopted for video encoding.
- Launched on 1 April 2006.
- Federative Republic of Brazil also adopted Japan's system on



U.S.A

Mobile Reception:
Under Consideration
Fixed Reception: ATSC

- Stream distribution services using mobile networks instead of terrestrial broadcasting have been started.
- In addition to DVB-H, new technologies such as Media-FLO are being considered.

Comparison of Mobile Reception Systems

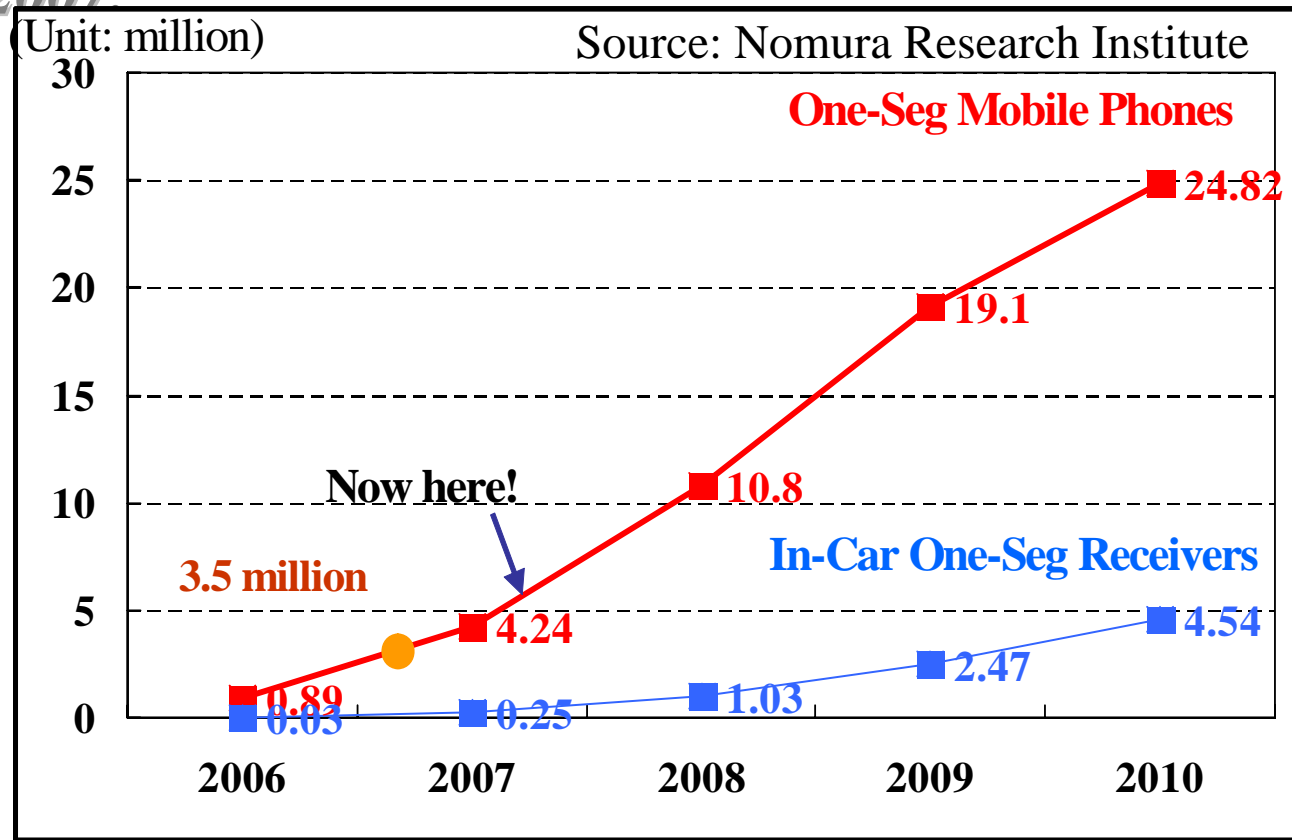
	Japan	Other Countries
Transmission system	ISDB-T (One-segment)	<ul style="list-style-type: none"> - T-DMB (KOR) - DVB-H (EU) - Media-FLO (U.S.A)
Service application	Video/Audio/Data	Video/Audio/Data
Assignment of new frequency bandwidth	Not necessary	Necessary
Additional license	Not necessary	Necessary
Service provider	Broadcaster (Free Service)	Broadcaster/Carrier/ Other company (Pay Service)
Emergency Warning Broadcasting System	Implementable	Cannot implement
Thrifty Power Consumption	Excellent	Depend on systems

17

Obviously ISDB-T is excellent system for mobile reception.

One-Seg service (1)

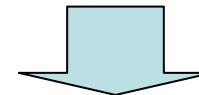
- *One-Seg is abbreviation for “one segment service”.*
- *One-Seg launched on April 1, 2006.*
- *More than 7 million cell phones with One-Seg service have been sold in the market according to JEITA statistics of End of April, 2007*



One-Seg service (2)



*No subscription fee
and
Powerful television contents*



*Unique & Unparalleled
Feature in the world*

Example of business model

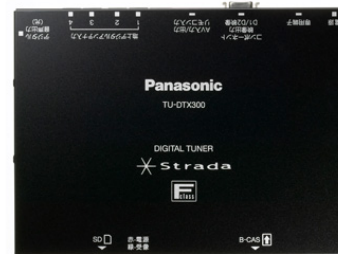
- Additional information service
 - TV shopping
 - Local service

One-Seg service (3)

One-seg receiver



Cell phone



Car TV



E-Dictionary



**USB
Tuner**

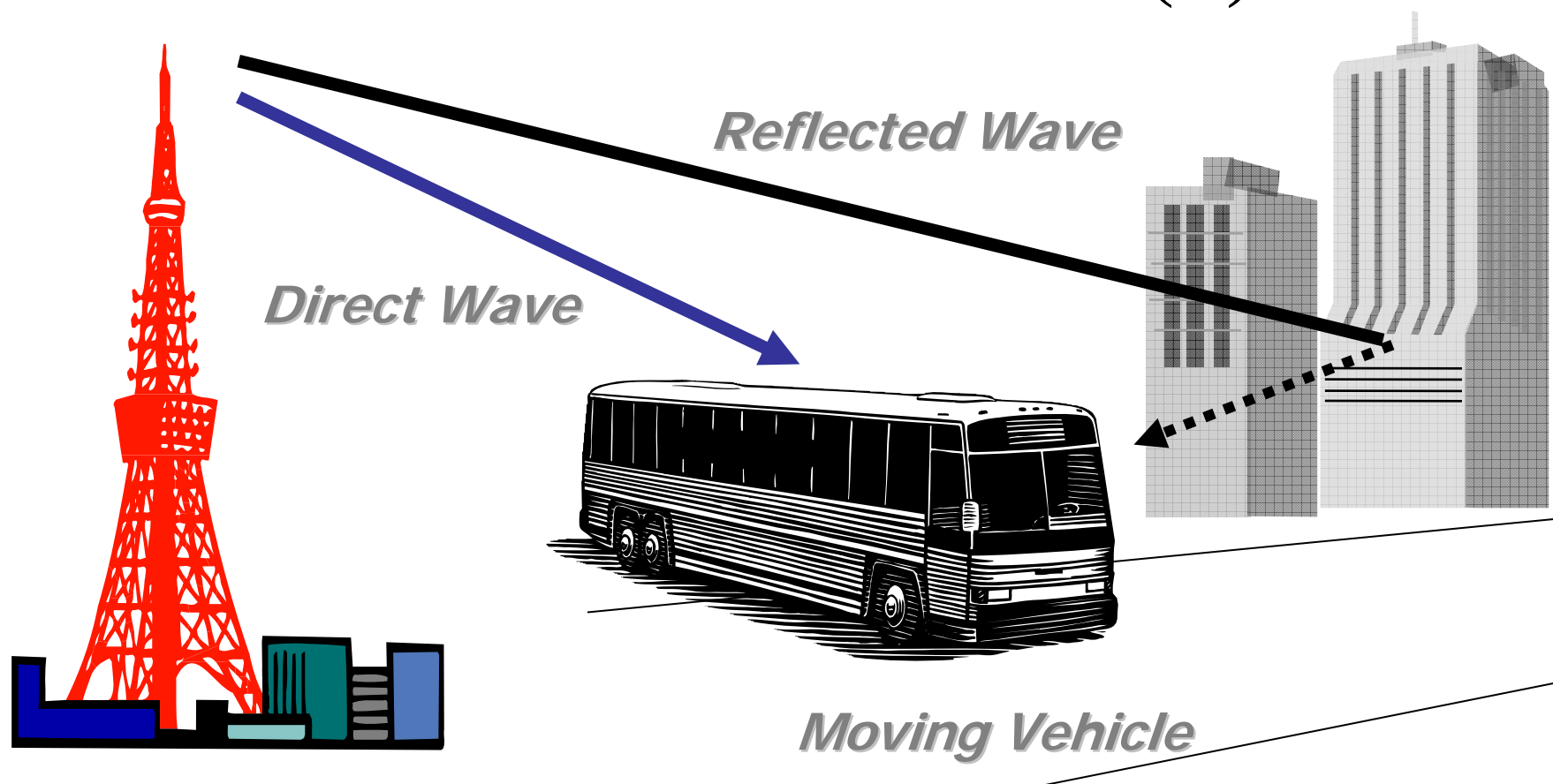


**Audio
player**



PC

HDTV mobile access (1)

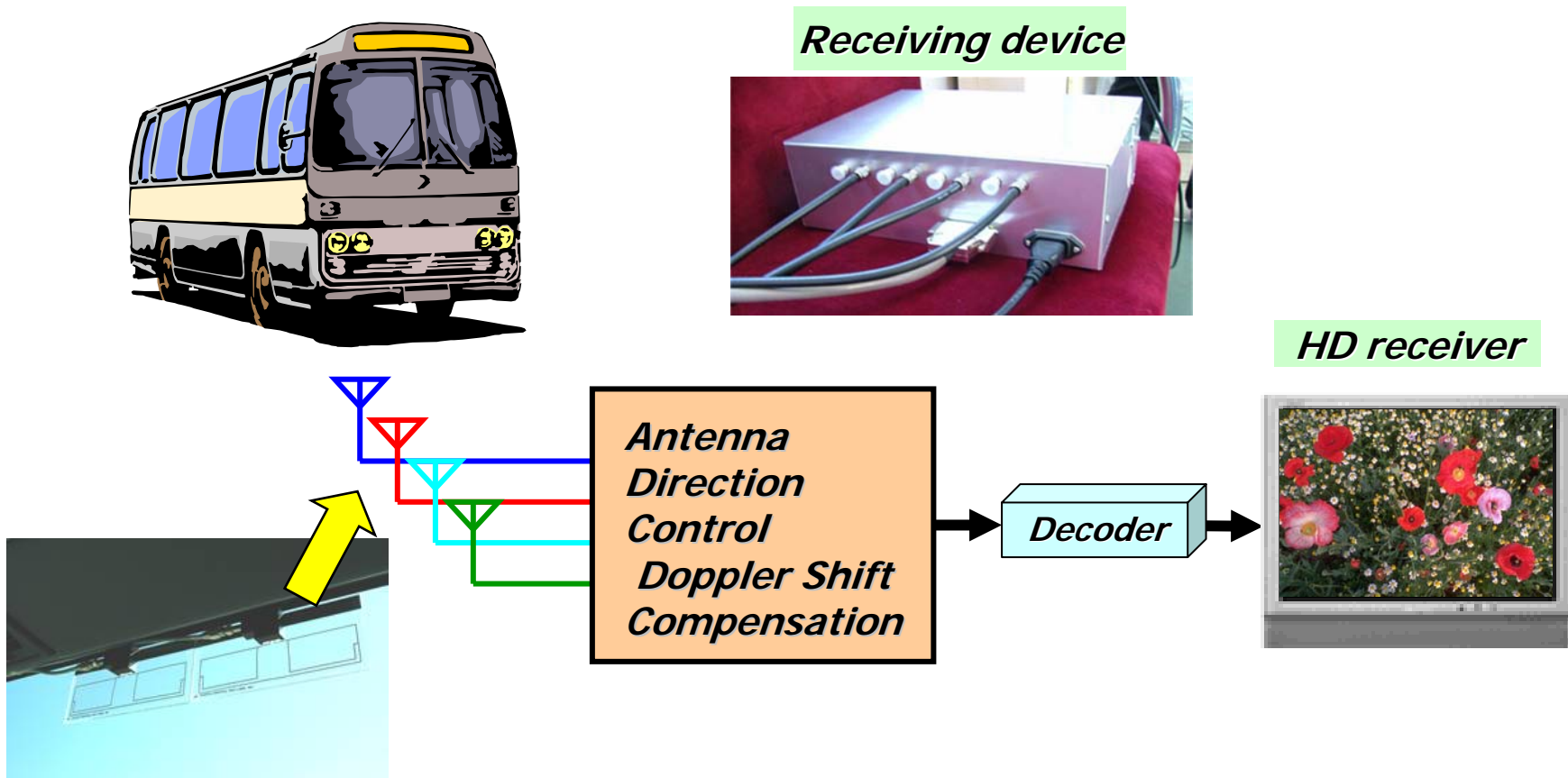


As described in technical features ISDB-T has powerful time interleave for mobile reception . With diversity reception technology, mobile reception service is now popular in Japan₂₁

HDTV mobile access (2)

Diversity reception technology

Adaptive Array Antenna on the vehicle's window



Adaptive Array Antenna

HDTV mobile access (4)

HDTV tuner for automobiles is now on sale.



Digital terrestrial television broadcasting tuner for automobiles



LCD for automobiles

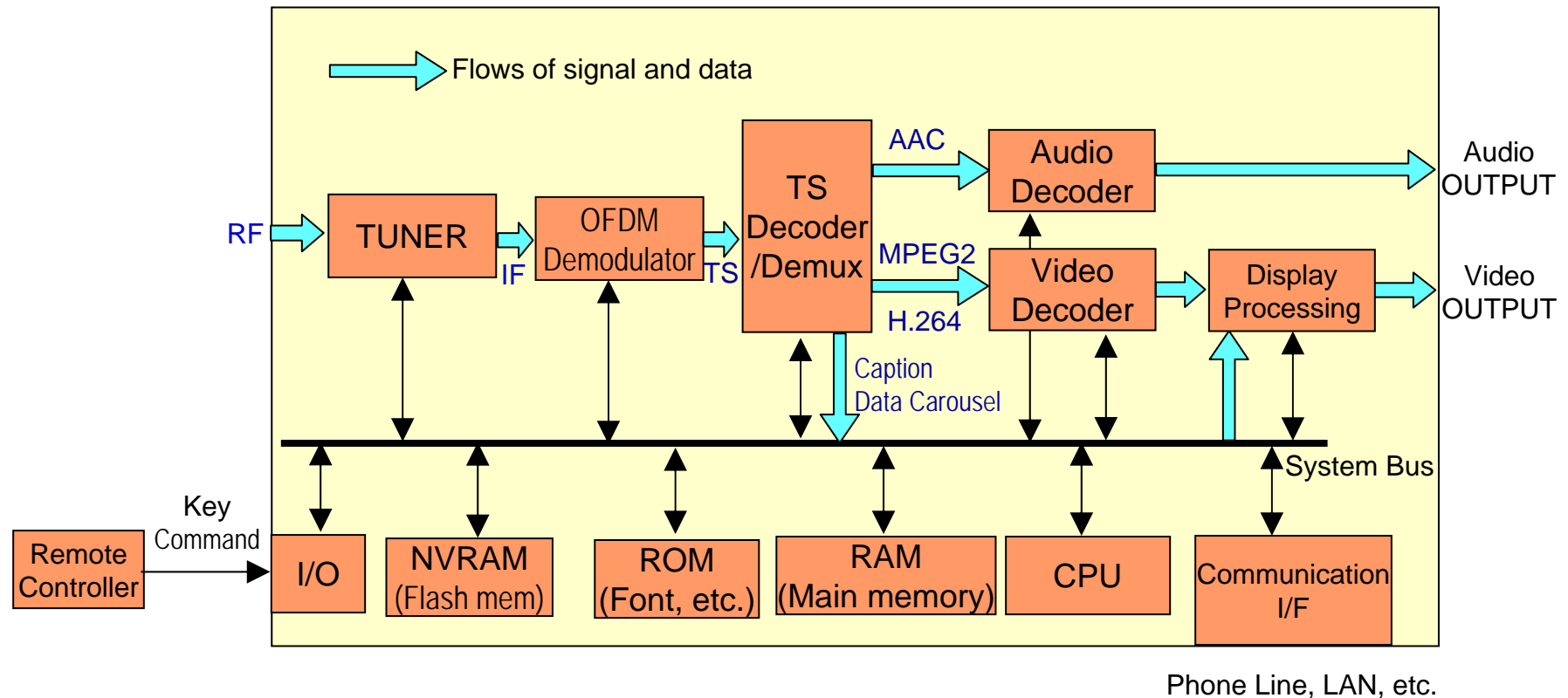
**High quality image wide-LCD panel.
Faithful reproduction of DVD and digital terrestrial television broadcasting image**

3. Outline of Digital Receivers in Japan

According to powerful applications of ISDB-T described in forward section, now many types of receivers are on market in Japan.

Technical details of digital receivers will be a theme of next lecture, so , in this section, only show the examples of digital receivers in market.

■ Hardware Components of a Basic Receiver



Between a Full-Seg receiver and a One-Seg receiver, the basic configurations are about the same, though there are some differences such as a tuner, video decoder, resolution of display and so on.

RF : Radio Frequency

IF : Intermediate Frequency

TS : Transport Stream

Demux : Demultiplexer

NVRAM : Non-volatile RAM

■ Fixed Receivers

PDP TV



VIERA TH-42PZ700SK
Panasonic



Wooo P42-HR01
HITACHI



PDP-A427HX
Pioneer

LCD TV



REGZA 42H3000
TOSHIBA



AQUOS LC-42RX1W
SHARP



VIERA TH-20LX70
Panasonic



BRAVIA KDL-40V2500
SONY



LCD-32HR100
SANYO



AQUOS LC-16E1
SHARP

SDTV



VIERA TH-15LD70
Panasonic



AQUOS LC-13SX7
SHARP

■ Fixed Receivers(Cont.)

HDD/DVD Recoder



RDZ-D800
SONY



DIGA DMR-XW51
Panasonic



VARDIA RD-S600
TOSHIBA



DVR-DV635
MITSUBISHI

Blu-ray



BDZ-V9
SONY



DIGA DMR-BW200
Panasonic

STB



TU-MHD600
Panasonic



DT400
MASPRO

STB-Cable



TZ-DCH1800
Panasonic

■ In-car Receivers

Navigation System ISDB-T(Full-Seg)/One-Seg



Strada CN-HDS965TD
Panasonic



AVIC-VH099G
Pioneer



HS706D-A
NISSAN/SANYO

One-Seg Only ※Full-Seg is Optional



GORILLA NV-HD830DT
SANYO

Portable Navigation Device

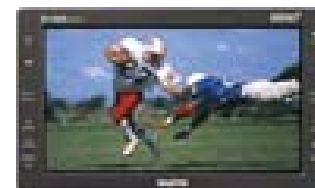
One-Seg Only



Mini GORILLA
NV-SD10DT
SANYO

In-Car TV

One-Seg Only



CAV-TD85D1
SANYO

■ Portable Receivers

Cell Phone One-Seg Only



W51SA



P903iTV



911SH



W52T



D903iTV



911T

au

14 models are available
at the end of May, 2007

NTT DoCoMo

4 models are available
at the end of May, 2007

Softbank

3 models are available
at the end of May, 2007

■ Portable Receivers(Cont.)

One-Seg Only

DVD Player



DVD-LX87
Panasonic



DVD-HP700ND
SANYO

Laptop



VAIO type T
SONY

Adapters(USB, etc.)



Many products are on sale.
BUFFALO, I·O DATA, etc.

Audio Player



gigabeat V30E
TOSHIBA

Dictionary



Papyrus PW-TC900
SHARP

Portable TV



XDV-100
SONY

4. Facilities of Broadcaster in Japan

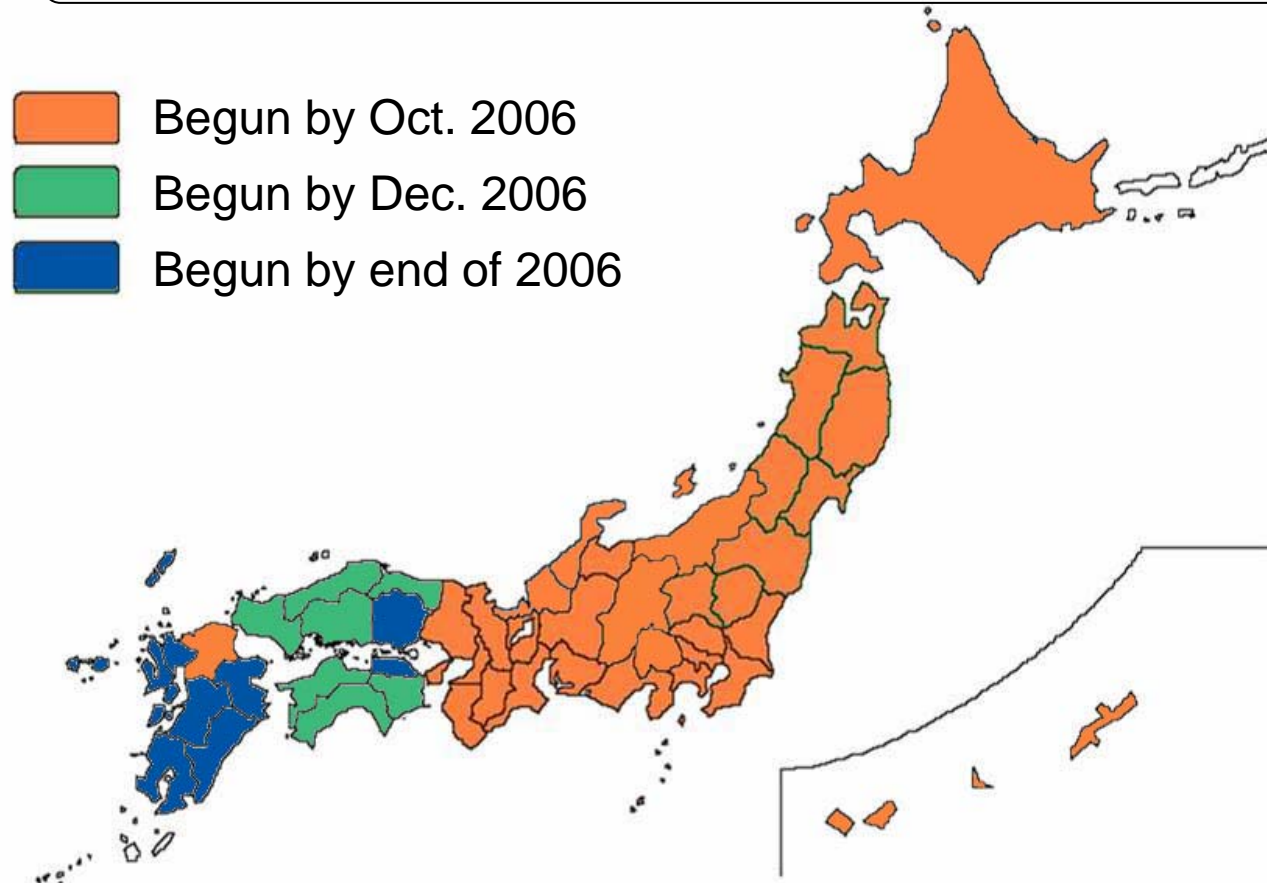
Digital Terrestrial Broadcasting has start from Dec.,2003 in 3 metropolitan area.

And from Dec. 2006, Digital Terrestrial Broadcasting has been in service in all prefecture.

In this section, show the several examples of Broadcaster's facilities, both studio system and transmission system.

Current situation in Japan

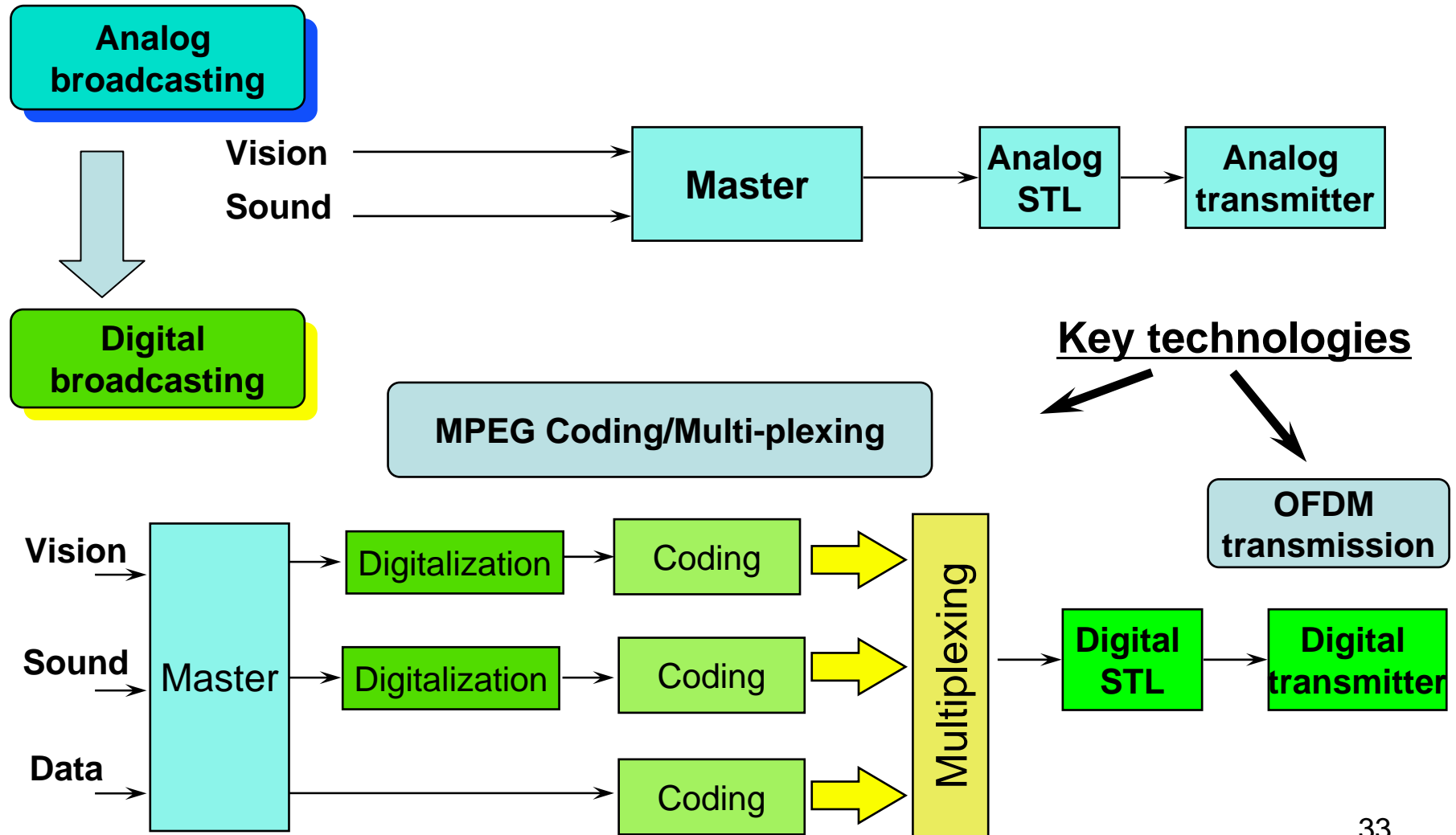
Digital Broadcasting Service



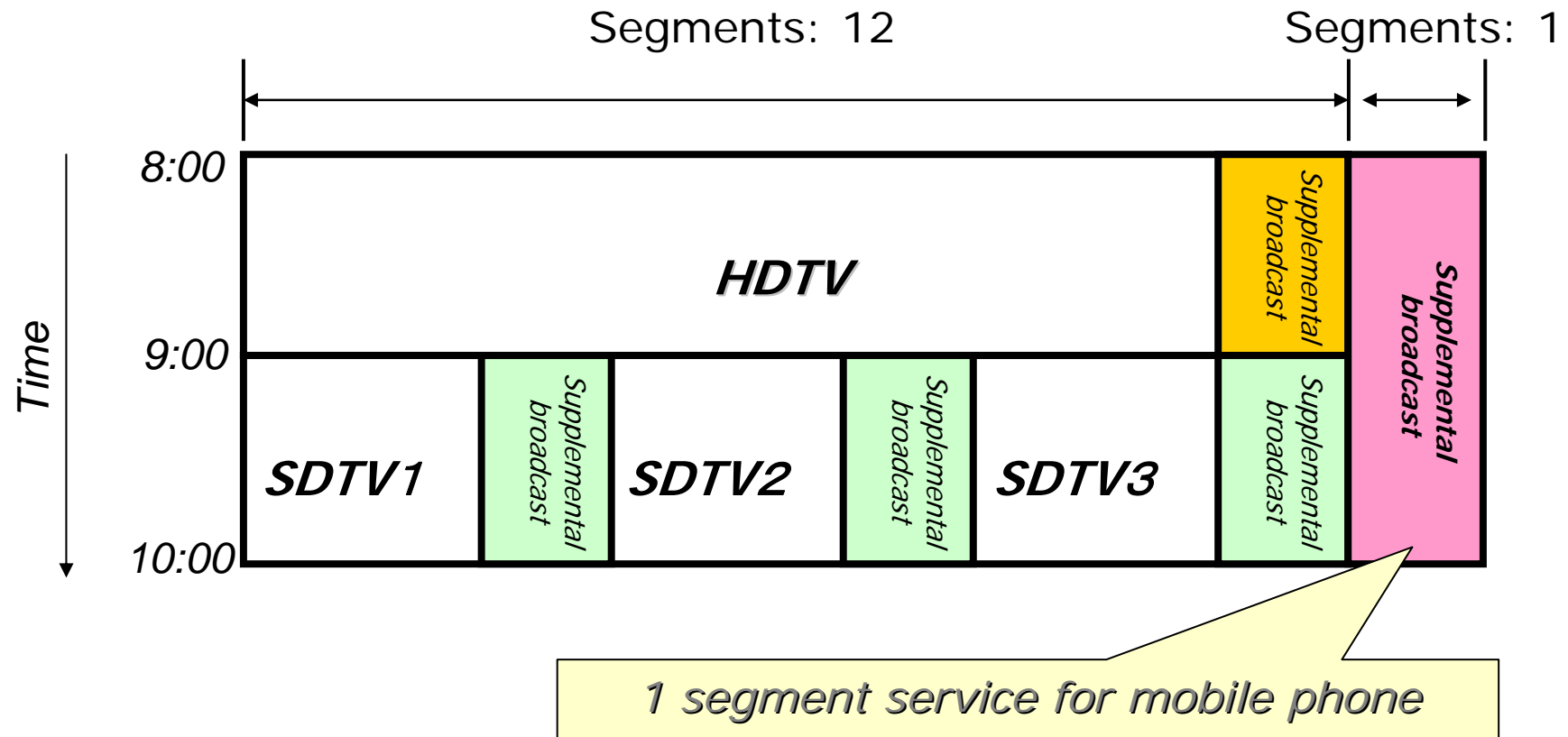
As shown below, Digital Terrestrial Broadcasting has started
In all Prefecture

Analog to Digital

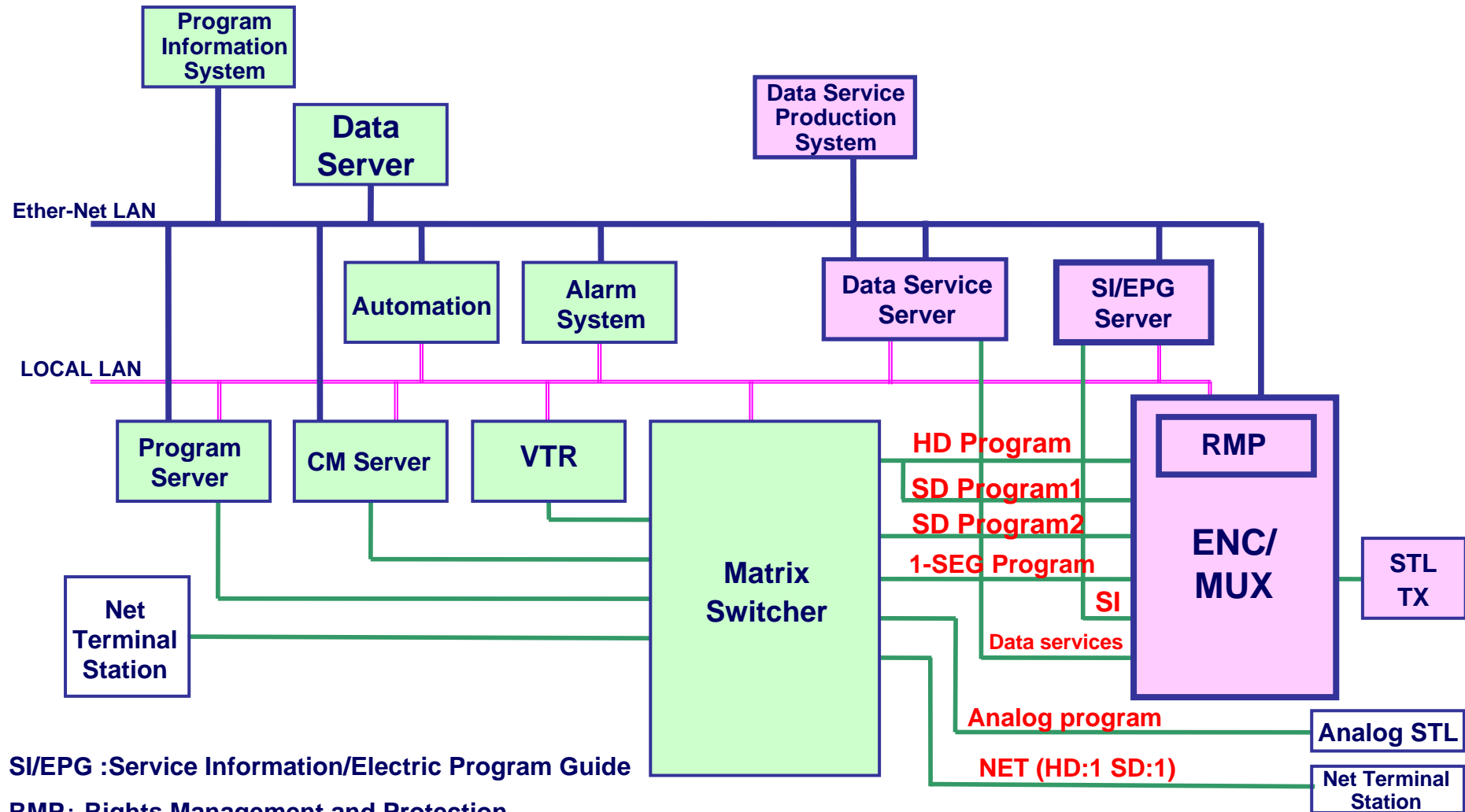
Differences Between Analog and Digital Broadcasting



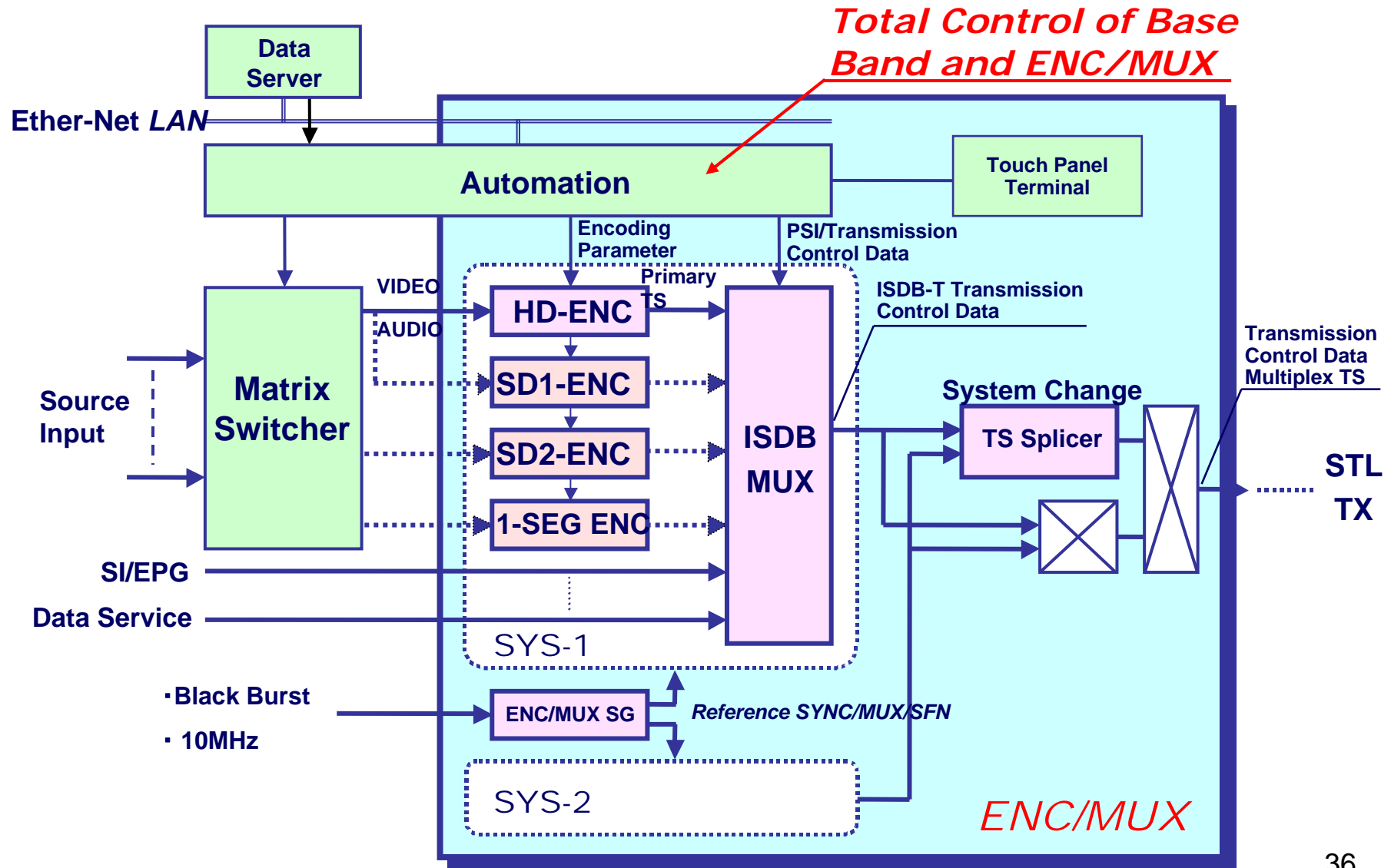
Applications



Overall Block Diagram



Block diagram of ENC/MUX



Example of Master system (TV Tokyo)



- Operation by few clues
- Efficient positioning
- Multi-view and/or selection on wide screen LCD,PDP
- Use touch panel for operation
- monitoring another line at monitoring booth

Example of Master system (TV-asahi)

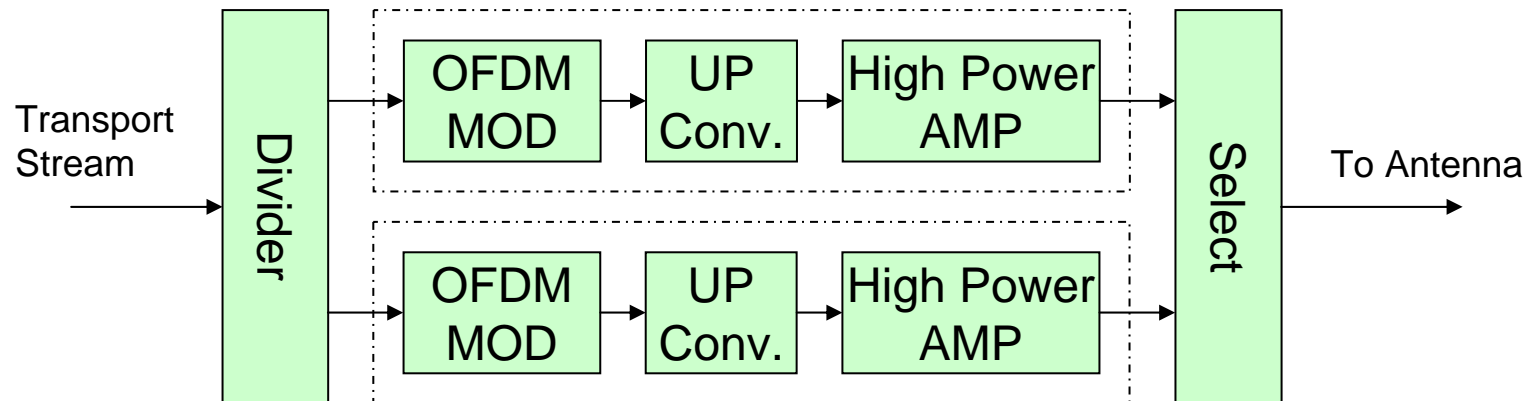


Examples of Transmission System

- (1) High Power Digital Transmitter System
- (2) Micro-wave Links of Digital Terrestrial Broadcasting
- (3) Trans-poser of Digital Terrestrial Broadcasting

(1) High Power Digital Transmitter system

(a) An Example of Conceptual block diagram (Full redundant system)



(b) Power Line-up in Japan

Area	Digital TX	Analog TX	note
Tokyo	UHF 10 kW	VHF 50 kW	wide area key station
Osaka	UHF 3 kW	VHF 10 kW	same as above
Nagoya	UHF 3 kW	VHF 10kW	same as above

(c) Examples of Hardware; see following pages

Examples of High Power Digital Transmitter (Toshiba)



**10 kW digital
Transmitter(2/3 type)**

Output power series;

- 10kW(2/3) type; for Kanto area
- 3kW dual type; for Kansai and Chukyo
- 1kW dual type; for medium cover area



0032

**3 kW digital
transmitter rack**



008

**1 kW digital
transmitter rack**

Feature;

- Any of cooling type (water or air)
- Equipped high performance non-linear distortion compensator

Examples of Digital Transmitter (NEC)

Features

- 1) Both liquid cooling / air cooling available
- 2) Compact size / Minimized footprint
- 3) Adaptive Digital Corrector to maintain optimal signal quality
- 4) Color LCD to monitor detailed parameters



3kW Air Cooled
UHF Digital TV Transmitter
(in operation at Osaka & Nagoya stations)



10kW Water Cooled
UHF Digital TV Transmitter
(in operation at Tokyo station)

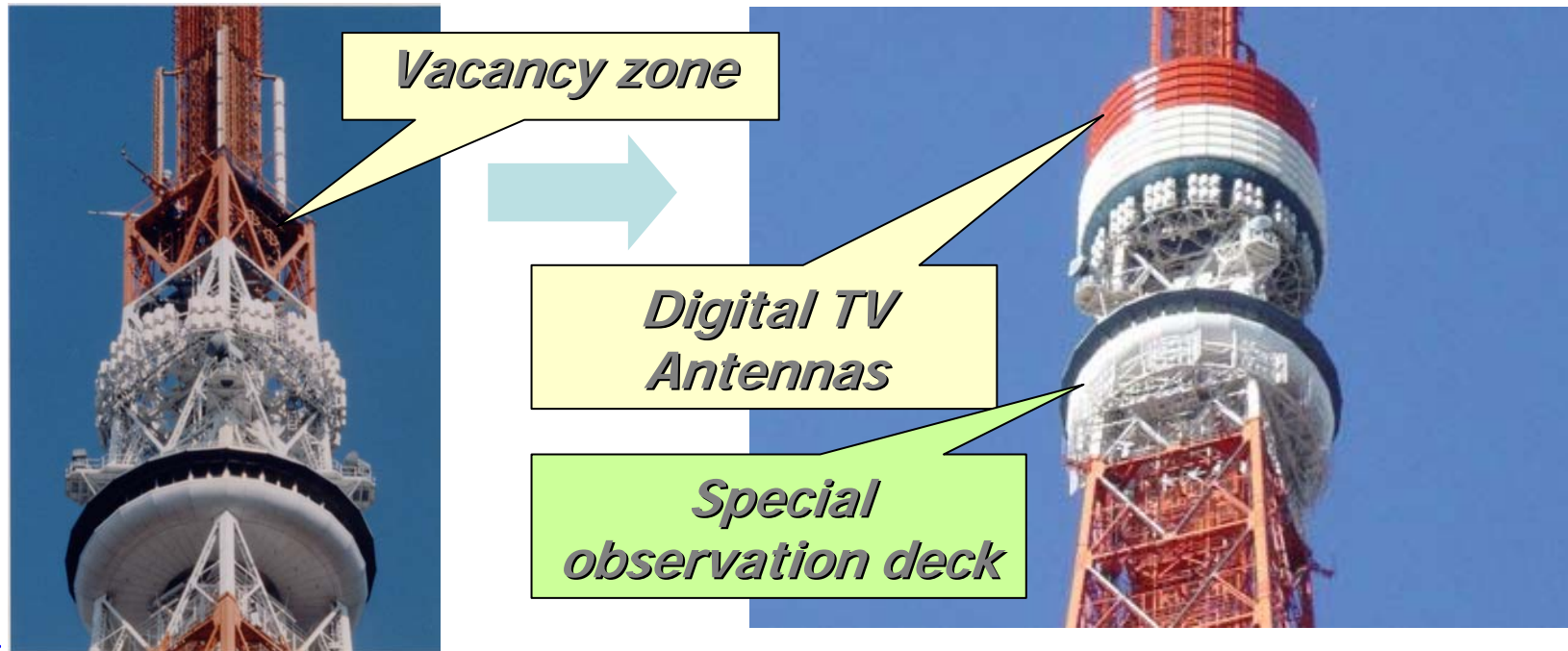
Antennas(1)

A number of analog TV antennas were already mounted on the optimum position of Tokyo Tower .



Antennas(2)

□ Vacancy zone is around 250m of Tokyo tower, There are no appropriate space except there. Digital antennas were designed, compact size, 6 meters in width and 12 meters in height.

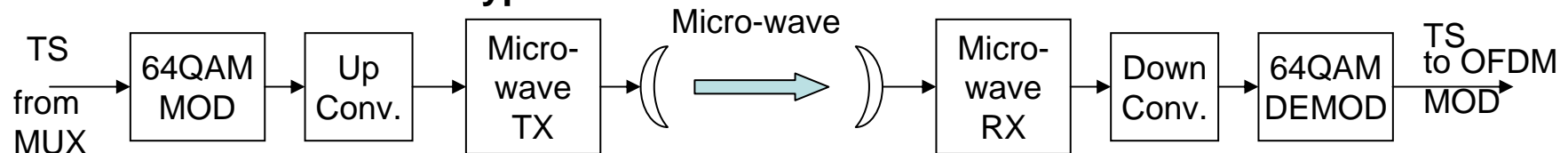


(2) Micro-wave Transmission Link

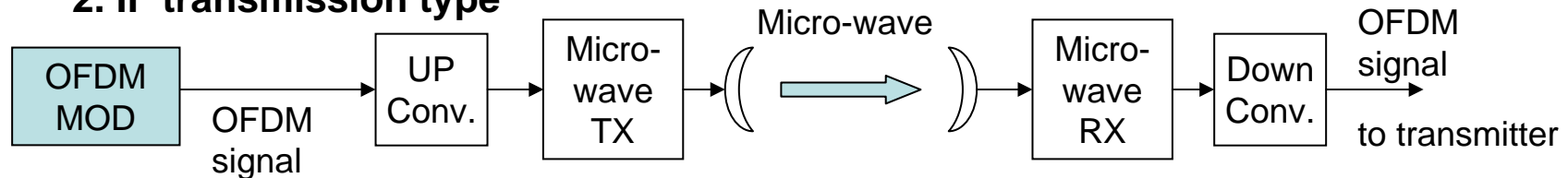
(a) STL(studio transmitter link) and TTL(transmitter transmitter link)

2 transmission types described below are available(can be applied to fiber transmission)

1. TS transmission type



2. IF transmission type

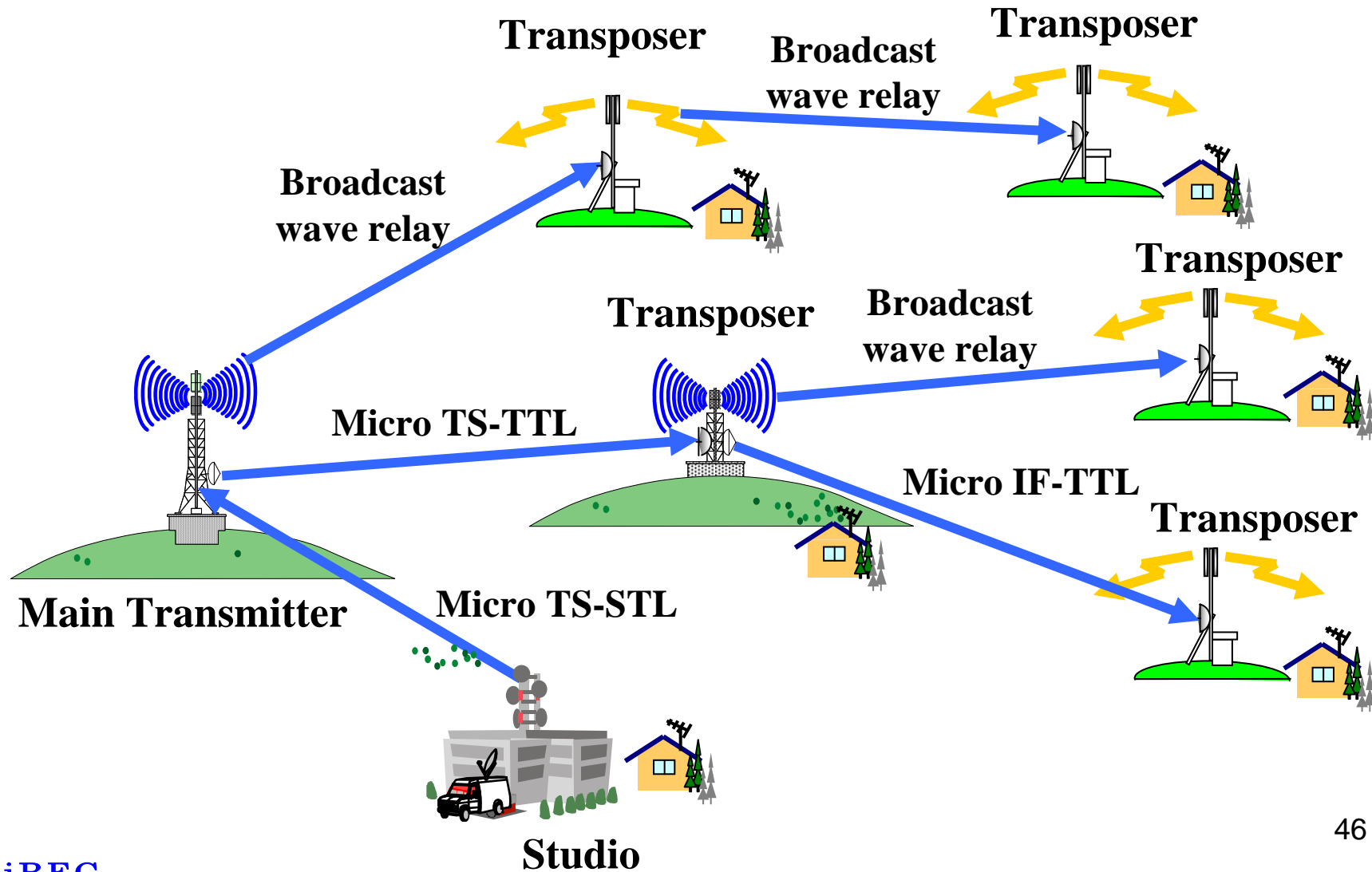


(b) FPU(Field Pick Up)

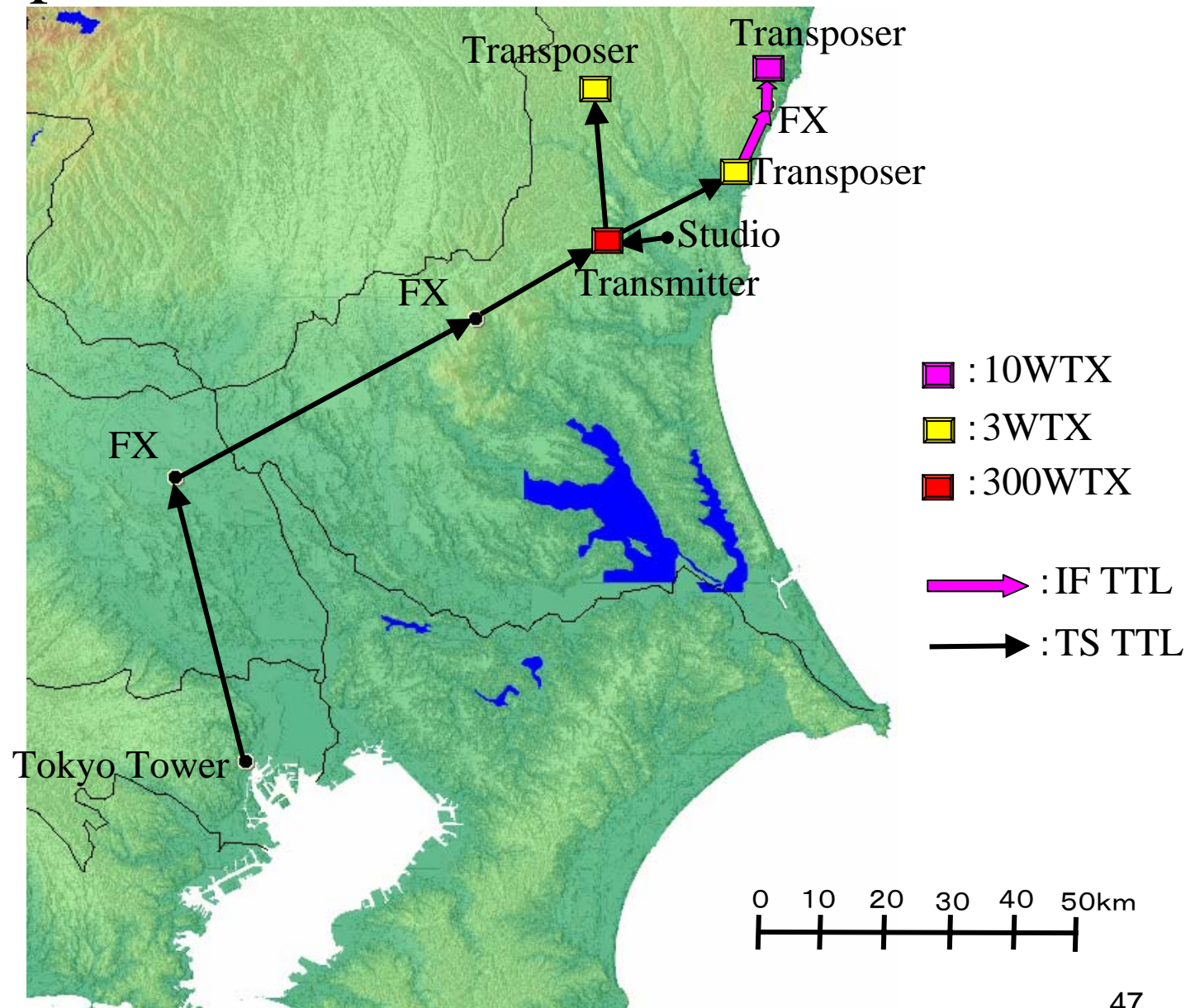
Field Pick Up is the outside program transmission system for news gathering and sports relay system, etc. Recently, digital modulation system such as single carrier QAM and OFDM are introduced.

(c) Examples of Hardware; see following pages

An Image of transmission network chain



Example of Wide KANTO area Network



Examples of Microwave STL/TTL (Toshiba)



TS STL/TTL TX TS STL/TTL RX

- Dual type, seamless switching
- DVB-ASI digital interface
- Equipped automatic multi-path equalizer



IF TTL TX/RX

- Dual type, TX/RX are installed in 1 rack
- OFDM IF signal interface
- Phase noise compensation technology with pilot signal

Examples of Digital Studio to Transmitter Link for TS Signal Transmission (Hitachi KokusaiElectric)



2 channels dual system

- Seamless SHF Output Signal Switching
- DVB-ASI Digital Signal Interface
- High-performance automatic equalizer diminishes multi-path distortion

Examples of Digital Transposer (NEC)

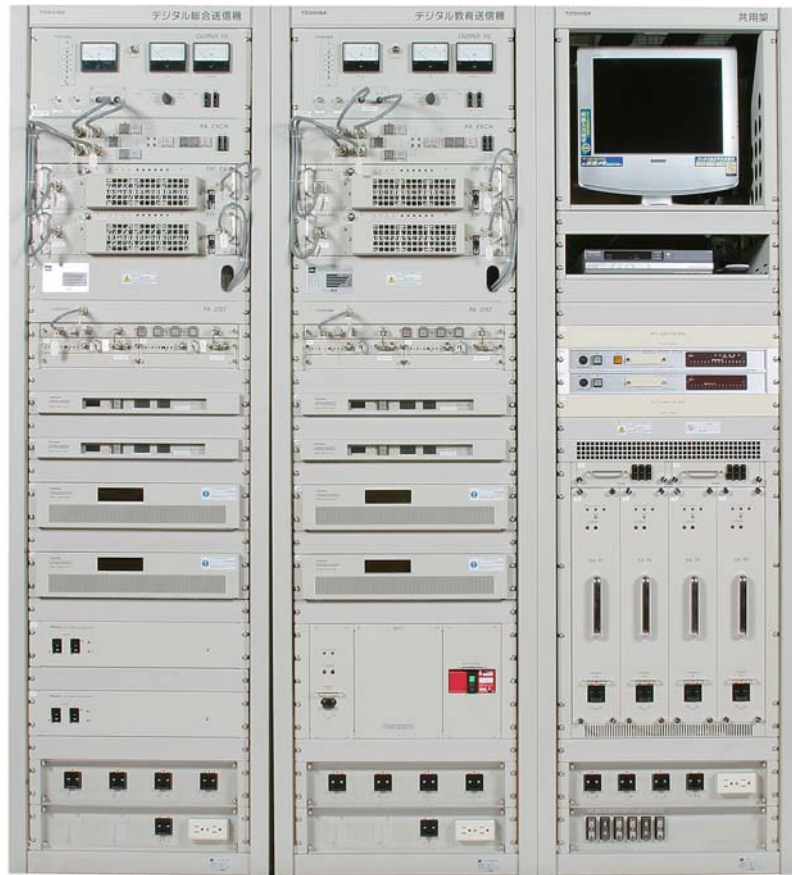
30W x 3-channels common amplification System



Features

- 1) Excellent IM (less than -50dB) using Feed-forward technology.
- 2) MCPA (Multi Channel Power Amplifier) is available.
No required of Channel combiner, especially, in the case of adjacent channel transmitting.
- 3) END (Equivalent Noise Degradation) improving equipment for on air receiving system is provided.
 - Loop canceller
 - Diversity receiver
 - Noise reduction (Re-mapping) Equipment.

Examples of Digital Transposer (Toshiba)



TS-TTL 3W TX



TS-TTL 50W TX

END of Seminar #7

Thank you for your attention