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<td>Author(s)</td>
<td>Lee, Kenneth.</td>
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Paper No. 20
ASEAN Seminar on Managing Radio & Television Broadcasting Digital Television Singapore,  
Kenneth Lee MediaCorp 19 October 2000

Scope

9 Background
  . DTV Field Trials
  . Digital Media Centre
  . Launch of DTV
  . Issues
  . Conclusions

National DTV Technical Committee formed in November 1997- to recommend standard from the three competing systems ATSC, DVB and DiBEG (ISDB)
  . consisted of 3 groups
    (i) Broadcasters and Service Providers
    (ii) Government/Regulatory Bodies and Research tertiary Institution
    (iii) Suppliers/Manufacturers from Broadcast Computer Industries

Terms of Reference
  . a need for robust digital TV signals
  . need for robust reception for mobile applications
  . compatibility with Singapore Cable Vision (SCV's) cable network
  . interoperability with Singapore ONE'S broadband multimedia services, availability and price of receiver sets

Selection Criteria
  . A set of criteria including both Technical and non-Technical aspects were drawn
    - Robustness
    - Applications
    - Cost-Availability
    - Interoperability
    - Potential for Growth
    - Efficiency
    - Scalability
    - Security

DTV Field Trials
  . Advanced Television Systems Committee (ATSC)
    - 8th June to 19th June 1998
  . Digital Video Broadcasting – Terrestrial (DVB-T)
    - 29th June to 10th July 1998
  . Integrated Services Digital Broadcasting - Terrestrial (ISDB-T)
Description of Field Trials

parameters of field trials were kept uniform to ensure common basis for comparison of data collected from the field trials, e.g.
- transmitters' sites
- transmitted power
- test reception sites
- test equipment
- test procedures

• some eighty locations, island-wide, were designated for fixed-point reception test measurements - locations with poor reception of analogue TV transmission were deliberately selected - test sites comprised of both HDB apartment blocks and low-rise private housing

Test Measurements

Calibration carried out every morning
Data documented includes:
- Site number
- Dabs & Time
- Weather
- Location
- Distance and bearing from transmitter
- Site description
- General site comments, etc.

• Noise floor & DTV signal power were measured

• Others were calculated:
  - DTV field strength
  - C/N ratios (nominal & at threshold)

• DTV passband spectrum tilt and stopband plots were generated

Field Test Vehicle

- pneumatically controlled antenna mast
- Fracarro UHF log periodic Yagi antenna
- Zenith RF black box (RF signal attenuator)
- NoiseCom noise generator
- Hewlett Packard vector signal analyzer (NTU)
- Gartnin GPS II plus receiver
- Thomson 14" TV & SCV Set-top Box
- digitized map of Singapore (CD-ROM)
- computer & printer

ATSC's Equipment List (DTV)

• Harris Transmitter (100V1)
• Sencore Computer
• Hewlett Packard Spectrum Analyser
• Zenith Test Decoder & HDTV Monitor
DVB's Equipment List (DVB-T)
- Harris Transmitter (100W)
- Matra & Thomcast DVB PI Adapter
- Hirschmann Transmitter (50W) 9 Philips Token MUX, Video Encoder, CSM Controller
- Computer Audio ADC, VGA Monitor, MPEG-2 Receiver/Decoder
- Cellware Network Adaptor
- ITIS & NDS Modulator & Receiver
- ITIS SFN Adapter
- National/Panasonic IRD
- HP Spectrum Analyser
- Tektronix MPEG Test Analyser
- Tekelec GPS Receiver

DiBEG's Equipment List (ISDB-T)
- NEC Transposer (50W) & Transmitter (100W)
- National/Panasonic DS VTR (NTSC)
- HP Power Meter Spectrum Analyser, Digital Transmission Analyser, Synthesized Signal Generator & GPS Receiver
- Toshiba D6 VTR (HDTV)
- Mitsubishi HDTV Encoder/Decoder
- NEC ISDB-T OFDM Modulator/Demodulator
- NEC SDTV Encoder/Decoder
- NEC MPEG2 TS Multiplexer/ Demultiplexer
- Sony Partial Receiver, Monitor & Mini Disc Recorder

Tests Conducted in Field Trials

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<thead>
<tr>
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<th>ATSC</th>
<th>DVB</th>
<th>DiBFG</th>
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<tr>
<td>Fixed Point Reception</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Indoor Antenna</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Reception</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Mobile Reception</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single Frequency</td>
<td>-</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Network</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HDTV</td>
<td>X</td>
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Unique Factors
- Small country
  - transmission efficiency not so critical
  - overlapping frequencies used for digital, analogue and other services unlikely
- Heavily built-up environment
  - emphasis on resilience to multi-path distortions of signals
  - reception at poor analogue reception areas
  - reception with indoor antennas
  - use of distributed lower power transmitters in SFN
- Strong interest in mobile applications
  - Concept of TV anytime, anywhere - updated information on the move
  - SFN operation required to ensure good mobile reception
- Government's intention to start DTV soon

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- announcement by Government to start DTV transmission in the year 2000
- availability and cost of equipment are important factors

System Choice

Suitable for mobile applications
- DVB-T is suitable for mobile reception due to its resilience towards multi-path distortions
- SFN capability of DVB-T allows for distribution of low power transmitters to cover places with severe multi-path distortions

• Availability of equipment
  - Government's decision to start DTV early
  - commercial service already started in UK
  - DVB-T's receiver and set-top boxes are already available in the market (e.g. UK)

• Comprehensive Standards and Documentation
  - standards are comprehensive and well documented
  - covers all delivery platforms

• Robustness of signal
  - robustness in receiving signals under both fixed & mobile conditions

• Interoperability
  - successfully conducted over ATM, the very same backbone network used in Singapore ONE (a nation-wide, broad-band network)
  - interoperable with cable network (SCV)
  - current deployment of satellite services in Singapore and the region

DTV Standard in Singapore

DVB-T was chosen as the digital terrestrial TV broadcasting standard for Singapore

Digital Video Broadcasting

Other Trials

• TV Mobile
  - Buses, LRT Train, MRT Train

HDTV
  - HD Production
    • 2 MTVs
    • Cultural Dance
    • National Day Parade 2000
  - HD Transmission
    • Broadcast Asia 2000

Digital Media Centre

Objective:
- To improve on operation efficiency
- To cut cost

How??
- By relocating all the different conties to a central location
- By using server system for playback
• $5m project
• Cater to both analogue and digital transmission
• Capacity to handle 15 channels Fully automated server playback system
• Will include facilities for datacasting, web streaming & interactive TV
• To be completed by early next year

DMC Equipment List

• Sony Flexicarts & Digital Betacams
• GVG Profile XPs
• Philips Saturn Switchers & Venus Routers
• Louth Automation System
• Harmonic (DiviCom) Encoders & Multiplexers

Launch of DTV

• Already started DN transmission
• Will introduce interactive content by early next year
• TV Mobile to be launched by Feb 2001

DTV Applications

• High definition TV (HDTV)
• Multi-channel surround sound
• Multi-lingual audio and subtitles
• Data broadcasting
• Digital video recording
• TV Mobile
• Interactive TV

Interactive TV Services

• Electronic program guide (EPG)
• Enhanced broadcast
• Interactive advertisement
• Polling/Quiz/Gaming
• Personalized IV/NVOD
• Interactive N portal
  • Games
  • Information-on-demand
  • T-commerce/T-banking
  • Internet applications

Benefits of DTV

• Viewers
  • Better quality picture and sound
  • Value-added services
  • New & improved lifestyle
• Advertisers
  • Direct marketing
• Broadcasters
  • Cost savings
  • New services
• Service Providers
  • New business opportunities
  • All these lead to money.
Reasons For Using DTV

- Pervasive & accessible
  - 100% penetration
  - 'sits at centre of family life'
- Easy to use
  - Cater to those less technology savvy
  - No boot-up required

Reasons For Using DTV

- Growth
  - Interactive television revenues will grow to more than US$32b by 2006. - Myers Report in partnership with eMarketer (6/00)
  - "TV portals" will emerge in full force by the year 2004. This type of phenomenon will drive a multi million dollar market upwards of US$4-10.7b.
  - Gartner Communications (6/00)

- Convergence
  - Content for the web can be easily repurposed for the TV
  - TV will be the centre of the home network in the near future

Issues

- Digital TV Infrastructure
  - Single Frequency Network
  - TV Mobile
  - Service information
- Production
  - Video Format (HD, Aspect Ratio)
  - Multi-Channel Audio
- Manpower
  - Right skills?
  - Training
- Delivery Platform
  - MAN
  - Indoor Antenna
- Consumer Set-Top Box
  - Electronic Program Guide
  - Features
- Return Path
  - Telephone line
  - ADSL
  - Wireless
- Regulatory
  - Subscription TV
  - ‘Must Carry’
  - Technical Standards to be conformed
- Business
  - Business model
- When to invest?
- Interactive Platform
  - DVB-MHP
  - Open TV, Media Highway, Liberate
- Convergence
  - Technology
  - Services
  - Devices
  - Industries

Conclusion

- DTV is a serious contender as an alternative platform for interactive services to the internet
- Coupled with captivating content
- Persuasive and approachable
- Easy to use
- Many uncertainties still
- DTV is here to stay