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<th><strong>Title</strong></th>
<th>Interactivity and diversity through digital TV.</th>
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<td><strong>Author(s)</strong></td>
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INTERACTIVITY & DIVERSITY
THROUGH DIGITAL TV
Kenneth Lee, TCS

Scope
• Introduction on DTV
• Diversity through DTV
• Interactivity through DTV
• The Road Ahead......
• Conclusion

What is Digital TV?
• Consumer
  • TV set that receives and displays digital TV
    signals
• Consumer Electronics Manufacturers
  • TV set with digital signal processing within
• Broadcasters
  • Digital transmission of video, audio and data

Digital Transmission
• Source Coding
  • MPEG Compression
• Channel Coding
  • Reed-Solomon Coding, Convolutional Coding
• Modulation
  • OFDM
• Broadcast

Block Diagram of Digital TV System

Benefits of Digital TV
• More efficient
• More robust
• Better picture quality
• Crystal clear digital quality sound
• More choice (programmes & applications)
• Greater interaction with TV
INTERACTIVITY & DIVERSITY THROUGH DIGITAL TV

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Benefits of Digital TV
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How can I receive Digital TV?
- Set-top box
- Integrated Digital TV set
- PC plug-in card

Diversity through Digital TV
- Digital TV Standards
- Delivery Platforms
- Applications
- Content

Digital TV Standards
- Advanced Television Systems Committee, USA
- Digital Video Broadcasting, Europe
- Digital Broadcasting Experts Group, Japan

Comparison of DTV Standards
<table>
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<tr>
<th></th>
<th>ATSC</th>
<th>DVB</th>
<th>DiBEG</th>
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<tr>
<td>Video</td>
<td>MPEG-2</td>
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<td>DVB SI</td>
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<tr>
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<tr>
<td>Transmission</td>
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<td>COFDM</td>
<td>BST-OFDM</td>
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World Adoption of Digital TV Standards

Delivery Platforms
### DTV Applications

- TV Mobile
- Single Frequency Network (SFN)
- High Definition TV (HDTV)
- Multi-Channel Surround Sound
- Data Broadcasting
- Multi-lingual Subtitling/ Multi-language Audio
- Digital Video Recording
- Interactive Services

### TV Mobile

- Concept of TV anytime, anywhere with updated information on the move
- Successfully tested on MRT trains, SBS buses and LRT trains
- Possible launch in other public transportations

### Single Frequency Network (SFN)

- Multiple transmitters are deployed for effective coverage
- Same frequency is used for these multiple transmitters
- Frequency spectrum is conserved

### High Definition TV (HDTV)

- Widescreen (16:9)
- 1920 x 1080 \( \Rightarrow \) > 2 million pixels
- Superior picture quality

### Multi-Channel Surround Sound

- Recreate cinematic experience at home
- 5.1 speaker system
- Dolby AC-3

### Data Broadcasting

- Data can either be programme related or otherwise
- Examples include Digital Teletext, Web pages etc

### Digital Video Recording

- Quality as good as the source
- Either on tape or on hard disk

### Interactive Services

- Interactive applications can be enhanced with local storage (hard disk)
- Further details to be provided later
**Digital TV Content (1)**
- Video
  - Standard Definition TV (SDTV)
  - Enhanced Definition TV (EDTV)
  - High Definition TV (HDTV)
- Audio
  - Multi-Channel Surround Sound
  - Multi-Language Audio

**Digital TV Content (2)**
- Data
  - Multi-lingual Subtitles/ Closed Captions
  - Interactive content
  - Programme associated data
  - Web pages/ Multimedia content
  - Digital Teletext
  - File transfer/ Software download

**Interactive Digital Broadcasting**
- Merges mass appeal of traditional TV with rich, interactive power of Internet
- TV is pervasive and easy to use
- May or may not require a return/ back channel
  - Telephone lines
  - Cable
  - Wireless

**Degree of Interactivity**
- Proto-Interactivity
  - return path is not required
  - eg Teletext
- Full Interactivity
  - return path is required
  - eg E-commerce

**Medium of Interactive Content**
- Broadcast
  - Audio, video and data streaming
- Walled Garden
  - Cached content
- Internet
  - Web browsing/ searching

**Interactive Services**
- Electronic Programme Guide (EPG)
- E-commerce/ Home Banking
- Personalized TV
- Interactive Advertisement
- On-demand Information/ Digital Teletext
- Polling/ Quiz
- Online Education
- Internet
- Games
Electronic Programme Guide (EPG)
- Programme guide for the multi-channel services
- Navigation tool
- Provide descriptions of programmes
- Allows sorting, searching, querying
- Gateway to interactive services
- Set user preference

E-Commerce/ Home Banking
- Pay Bills
- Purchase Merchandise
- Book Airline Tickets/ Travel Packages
- Order Groceries
- Check Bank Statements
- Transfer of Funds

Personalized TV
- Requires hard disk
- Based on user profile
- Creates your own channel
- Automatically records your favourite programmes
- Control over viewing
- Watch when you want, what you want and how you want

Interactive Advertisement
- Can be based on user profile
- Direct marketing channel
- Banner ads
- Special ad content
- Provide detailed product information

On-demand Information/ Digital Teletext
- Data broadcast
- Could be programme related or otherwise
- Real-time information
  - Weather
  - Traffic
  - Stock market

Polling/ Quiz
- Feedback from viewers through polling
- Simple home viewers' quiz
Online Education/ Course
- Course material is broadcast
- Interactive exercises/ tests
- Enhance learning experience
- Programme may be repeated with the help of local storage

Internet
- Web browsing
- Email
- Internet Chat
- File Transfer/ Software Download
- Simultaneously while watching the TV

Games
- Online gaming
- Interactive games

Benefits of Interactive Digital Broadcasting
- Viewers
  - convenience
  - value-added services
- Advertisers
  - capture consumers' feedback
  - targeted advertising
- Broadcasters
  - new revenue opportunities

Technologies & Standards of Interactive Digital Broadcasting

Who has started Interactive TV?
Issues to Interactive Digital Broadcasting

- Interactive platform
- Return channel platform
- Conditional access/Security
- Business Model
- Privacy

Factors to Successful Interactive Services

- Relevant content
- Value-added
- Ease of use
- Instant access
- Secure network
- Local storage
- Built-in safety checks

The Road Ahead......

Future Trends

- Set-top boxes will have increasing power and storage capacity
- Voice technology
- Home networking
- More converging products
- Ubiquitous wireless and net access
- Bumper bandwidth

TCS' Direction

- Exploit latest technology to provide quality picture and sound
- Provide value-added programmes and services to our viewers
- Continue to enrich and delight the world

Conclusion

- DTV is here to stay
- New and wide range of services
- Change the lifestyle of people
- Evolve and converge with the Internet and telecommunications