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<tr>
<td><strong>Author(s)</strong></td>
<td>P. S. Sundaram</td>
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Radio: Due for Another Renaissance

by

P. S. SUNDARAM

7th AMIC Conference on "Asia’s Information Market
Place: Race for Technology, Content & Competence"
May 21-23, 1998 Bangkok

Benefits of Broadcasting.....

- Broadcasting is a Vital Component of domestic communication infrastructure of a country
- huge investments have been made through out the world by public and private broadcasters
- It provides the most efficient means of delivering mass message
- Broadcasting offers benefits of universality and portability
Radio is Great!

- Radio has the best pictures, to the extent the listener can imagine
- Radio forges an emotional link among its listeners
- Radio's local nature is its great strength
- Radio is without competition in an increasingly mobile world
- Radio has a worldwide reach with minimum cost

...Eddie Fritts
President, NAB
The Road to the success of radio

| CONTENTS |  the consumers need |
| INFRASTRUCTURE | delivery mechanism |
| TECHNOLOGY | quality, new services |

"Any amount of Technology can not make up for uninteresting content"

---

Consumer Electronics - market growth
(America, Japan & Asia-Pacific)

<table>
<thead>
<tr>
<th>Year</th>
<th>America</th>
<th>Japan</th>
<th>Asia-Pacific</th>
</tr>
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<tbody>
<tr>
<td>1993</td>
<td>20</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td>1994</td>
<td>22</td>
<td>16</td>
<td>12</td>
</tr>
<tr>
<td>1995</td>
<td>24</td>
<td>18</td>
<td>14</td>
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Billion US$
**Consumer Market (1989 - 1995)**

**Number of AM radio receivers in millions**

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<tbody>
<tr>
<td>World Total</td>
<td>771</td>
<td>1307</td>
<td>1877</td>
<td>2008</td>
</tr>
<tr>
<td>Africa</td>
<td>19</td>
<td>49</td>
<td>108</td>
<td>122</td>
</tr>
<tr>
<td>America</td>
<td>360</td>
<td>566</td>
<td>711</td>
<td>766</td>
</tr>
<tr>
<td>Asia</td>
<td>78</td>
<td>264</td>
<td>566</td>
<td>621</td>
</tr>
<tr>
<td>Europe</td>
<td>314</td>
<td>418</td>
<td>464</td>
<td>481</td>
</tr>
<tr>
<td>Oceania</td>
<td>10</td>
<td>20</td>
<td>26</td>
<td>28</td>
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</table>
Number of AM radio receivers in millions

MARKET AND TECHNOLOGY CONVERGENCE

Broadcasting

Telecommunications

Computers

Satellite Communications

CDMA TV

"Wireless"

Radio ➔ B/W TV ➔ Color TV ➔ Digital TV

Telegraph ➔ Telephone ➔ Data

Calculations ➔ Computing ➔ Data

Telephony ➔ TV ➔ Data

TV ➔ Digital Audio ➔ Digital TV

2-Way Radio ➔ Pagers ➔ Cellular ➔ Data ➔ TV
Terrestrial Radio Broadcasting

As per ITU regulation, the following terrestrial Radio Broadcasting Services are permitted

- Medium Wave
- Short Wave........ National / International
- FM (Frequency Modulation)
- Digital Radio Broadcasting (Future)
- Ancillary services such as data broadcasting / additional sound in the above four categories.

NEW TECHNOLOGIES FOR RADIO BROADCASTING
ANALOGUE AM SHOWS SLOW DECLINE IN LISTENING DUE TO:

- LISTENERS DEMAND FOR QUALITY
- FM PROVIDING HIGH QUALITY COMPETITION [CD QUALITY]
- CABLE RADIO
- RADIO USING DTH SATELLITE
- AVAILABILITY OF IMPROVED INTERNET AUDIO

ANALOGUE AM BROADCASTING

DISADVANTAGES:

- VARIABLE PROPAGATION & INTERFERENCE [SW & MW]
- LOW QUALITY AND AUDIO BANDWIDTH
- REQUIRES HIGH POWER TRANSMITTERS [SW: 100-500 KW] [MW & LW: UP TO 2 MW]
- NO ADDITIONAL DATA CAPACITY FOR STATION NAME, FREQUENCY OF TRANSMISSION OR PROGRAMME CONTENTS.

REQUIRES MULTIPLE FREQUENCIES TO ENSURE DELIVERY IN CASE OF DIFFICULTY PROPAGATION [SW]
DIGITAL SYSTEM IN AM BROADCASTING NETWORK

EXPECTED IMPROVEMENTS:

- IMPROVED, MORE CONSISTENT QUALITY
  [BANDWIDTH ~ 9 KHz INDEPENDENT OF PROPAGATION EFFECT]
- LOWER HF POWER REQUIREMENT
  [BROADCASTERS]
- LESS FREQUENCIES PER PROGRAMME IN SHORT WAVE USE
- AUXILIARY DATA POSSIBLE [STATION NAME, FREQUENCY TRANSMISSION OR PROGRAMME CONTENTS]

DIGITAL SYSTEMS IN AM BROADCASTING NETWORKS

DISADVANTAGES:

- NEW RECEIVERS REQUIRED BY LISTENERS
- MINOR MODIFICATION FOR NEW GENERATION TRANSMITTERS OR REPLACEMENT OF OLD GENERATION TRANSMITTERS
- TRANSITION PERIOD
DIGITAL AUDIO BROADCASTING

(DAB)

DIGITAL AUDIO BROADCASTING

- Digital audio broadcasting - the technology of tomorrow permits transmission of multiple audio programmes of "CD quality" from satellite or terrestrial transmitters
- The technique to be adopted like Digital Compression using Psycho-acoustic modelling and new modulation technique (COFDM) would make mobile reception reliable & enjoyable
- The problems of multipath reflections in FM will be overcome by DAB
- Ideally suitable for satellite / terrestrial to home / portable /fixed as well reception in vehicles
- DAB is spectrum efficient and permits broadcasters to transmit multiple programmes within the limited bandwidth
Current World Scenario in Radio Broadcasting

Digital Audio Broadcasting (DAB) Technology

- Provides multiple channel CD quality sound through satellite and terrestrial medium
- Uses special modulation techniques to provide mobile reception
- Eureka 147 (Europe & Worldspace (USA) systems are in experimentation/field trial

Implications

- Cost of receiver is presently high
- Cost is likely to come down in near future
World Space System Objectives

- Satellite broadcast of radio programs with quality selectable from mono-AM to CD
- National, regional or global broadcasts
- Direct uplinking from where the action is
- Easy transition to narrow-band video and multi-media reception
WorldSpace Broadcast Service Areas

WorldSpace Orbital Configuration
DIGITAL HF BROADCASTING

CONSUMERS

TWO BILLIONS OF RECEIVERS IN THE WORLD
ANNUAL POTENTIAL MARKET: AROUND 100 MILLION
OF RECEIVERS DURING 20 YEARS

PROFESSIONALS

20,000 AM TRANSMITTERS INCLUDING 2500 SHORT
WAVE TRANSMITTERS

POGRAMES

BENEFIT FROM NEW DIGITAL TECHNOLOGY
RADIO DATA SYSTEM (RDS) & DATA RADIO CHANNEL (DARC)
RDS & DARC Technology

- Data transmission on an FM sub-carrier (57 KHz) in the worldwide common FM band 87.5 - 108 MHz
- FM coverage is available anywhere in the world
- RDS protocol is a Multi-applicative standard
  - RDS Car radio and Traffic message channel
  - Radio text and Paging
  - Dedicated applications (DGPS, EWS,...etc)
- Data transmission at 1.2 Kbit/s with a bandwidth of the subcarrier of 4 KHz
DARC Technology

- Developed initially by NHK in Japan
- European equivalent: System for Wireless Infotainment Teledistribution (SWIFT) which involved France, Sweden and Norway on partnership
- Data transmission on the 76 KHz FM Sub-carrier with a bandwidth of 35 KHz
- High speed data transmission: 16 kbits/s
- Application: Traffic information services, Text and Data services, DGPS, Radio Paging

Delhi 102.6 M Hz News Headline
VISUAL INFORMATION RADIO SETS NEW STANDARDS IN THE MEDIA
Current World Scenario in Radio Broadcasting

Data Broadcasting

Technology
- Uses existing spectrum and network infrastructure
- Applications - educational and information services

Benefits & Implications
- To disseminate information nationwide through information booths
- Special decoder/receivers needed
- Will revolutionise information dissemination

WHAT DO WE NEED?

'A NON-PROPRIETARY SINGLE WORLDWIDE STANDARD FOR DIGITAL BROADCASTING IN THE SHORT WAVE, MEDIUM WAVE AND LONG WAVE BANDS'

LIKELY AGREEMENT ON SUCH A STANDARD WITHIN THE NEXT TWO TO THREE YEARS
CONVERGENCE - a Reality

• MERGER OF
  ● Telecommunication
  ● Broadcasting Media
  ● Computer Industries

is becoming a reality

• Convergence Industries use broadcasting, telecommunication, cable TV and satellite as communication paths

Conclusion

• Amidst several new broadcast services such as Digital Television, DTH and Communication technologies - V-SAT, Cellular etc., radio broadcasting will continue to play a dominant role.

• The digital technology will lead to Digital Radio Broadcasting to provide multiple and high quality services
Conclusion (Contd.)

- Data broadcasting through radio is likely to become popular for dissemination of information

- Standardization of Digital Transmission services is essential to bring in affordable receivers and related consumer products

Thank You