A Case For Digital Radio

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Featuring
GatesAir's

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Chief Product Officer

A Case For Digital Radio

Richard Redmond

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Chairman Marketing Committee – World DMB Forum

Agenda

- Digital Systems in use
- Digital Lowers Costs
- Consumer Trends
- Data content delivery
- Advanced applications
- Summary

WORLD DMB Digital Multimedia Broadcasting
Radio • Mobile TV • Multimedia • Traffic Data

HD Radio™ Pure Digital. Clear Radio.

drm

Key Digital Standards

WORLD DAB Digital Multimedia Broadcasting
Radio • Mobile TV • Multimedia • Traffic Data

WWW.WorldDAB.ORG

- **DAB DAB+ DMB - Uses Band III VHF and L-Band to provide a suite of audio and multi media services**
  - Common transmission infrastructure
  - Occupies 1.5 MHz RF bandwidth
  - Supports Multiple Audio channels
  - Multiple Video Channels

HD Radio™ Pure Digital. Clear Radio.

WWW.iBiquity.com

- **HD Radio – Uses existing AM and FM frequencies to provide audio and multi media services**
  - Broadcast in analog and digital simultaneously
  - Uses current AM or FM channel – no new spectrum
  - Supports Multiple Audio channels
  - Offers wide array of data services

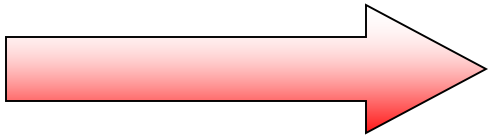
drm

WWW.DRM.org

- **DRM – Uses existing SW, AM and now with DRM+ FM frequencies to provide audio and multi media**
  - Broadcast in analog and digital simultaneously
  - Uses current AM or FM channel – no new spectrum
  - Supports Multiple Audio channels
  - Offers wide array of data services

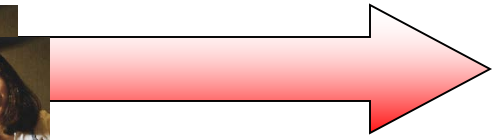
Shifting Paradigm

Analog Radio



One program stream to one transmitter

Digital Radio

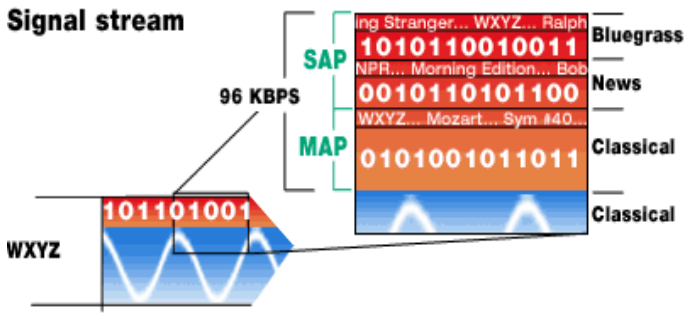


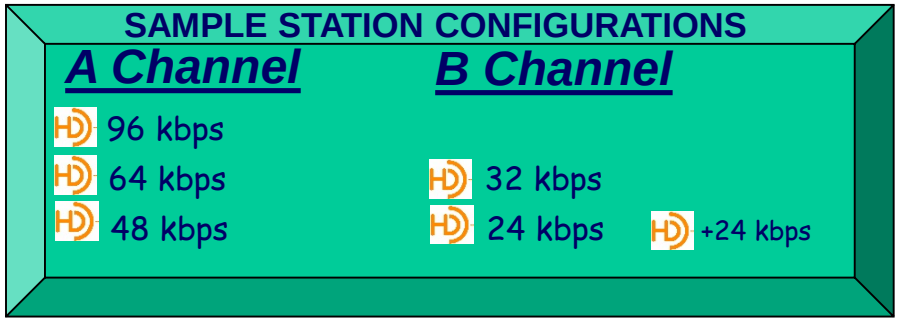
Many program streams to one transmitter

Drives increase in content management needs – processors, automation, data management, STL links, monitor & control

Multicasting

- Basis of DAB, currently implemented for DRM and HD Radio
- Allows multiple different programs on the same transmitter
  - Expand current AM/FM networks
    - Multi – language programs
  - Efficient use of Spectrum
  - Establish new revenue streams
  - Create unique content to drive Digital Radio adoption





- DAB+ with new MPEG4 HE-AAC coding increases each multiplex from 9 to 29 services with equal or better quality

Multicasting reduces cost per channel!!!

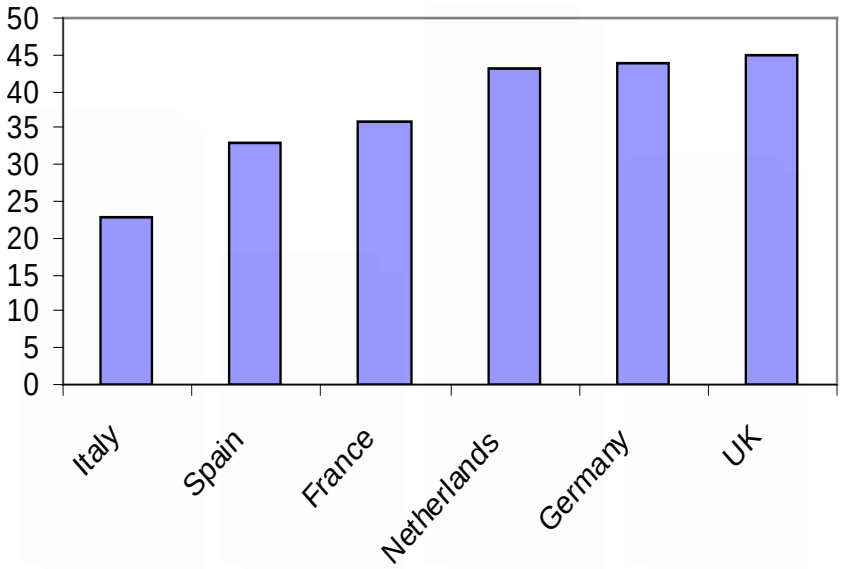
What about the consumer...

- DRDB – Car Radio Market Overview, May 2008
- More hours are spent listening to the radio in car than any other location on a weekday
- 61% of people would miss the company radio provides
- 63% would expect a new car to have DAB/FM or DAB/FM/CD as standard
- 25 to 34 year olds spend on average 60% of their weekday radio listening time in-car
- People who drive to work spend almost 55% of their radio listening time in the car
- Just under half of people asked stated that it is quite important for a new car to have the latest technology in their car entertainment system

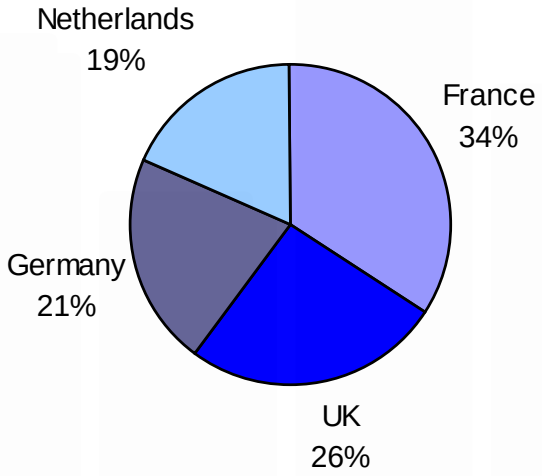
Source: DRDB

When I'm driving in my car...

"Drivers would rather sit in their cars twice as long than change jobs, move house or change their work base" Edmund King, RAC Foundation



Commute times Europe (minutes)



Radio listening in-car, Europe

(Source: RAC Foundation 2003 / Edison/ArbitronMedia, "Shifting Gears: The In-car Study")

Evolving requirements

"I just missed the weather report/news…"

"I wonder who that song is by.."

"Where can I buy that album…"

"Great, I can enter a competition for tickets to…."

"I want to build a profile of my listening habits, my favourite songs and I want information which is interesting to me to be added to my profile…"

Content is king

- New content vs Simulcast
- Applications: Slideshow, EPG, DLS, BWS, TPEG, BIFS
- Interactivity & future radio: Tagging, Filecasting
- Plans for new services
- New revenue opportunities for advertisers
- Connectivity with other media: iPod docking station, Internet & digital radio
- Broadcasters, Manufacturers working together to get the content on-air on devices which will attract consumers

Radio of the future – Today!

Example of Tagging UK & USA

Example of Slideshow UK

Example of Traffic
USA, UK, Australia Korea

Example of BIFS France

Example of Weather Info Germany

Example of DLS Australia

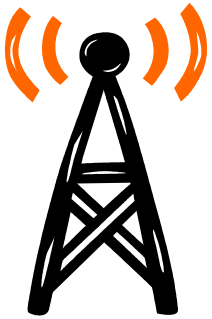
Source: Global Radio, RTL, SWR, CRA

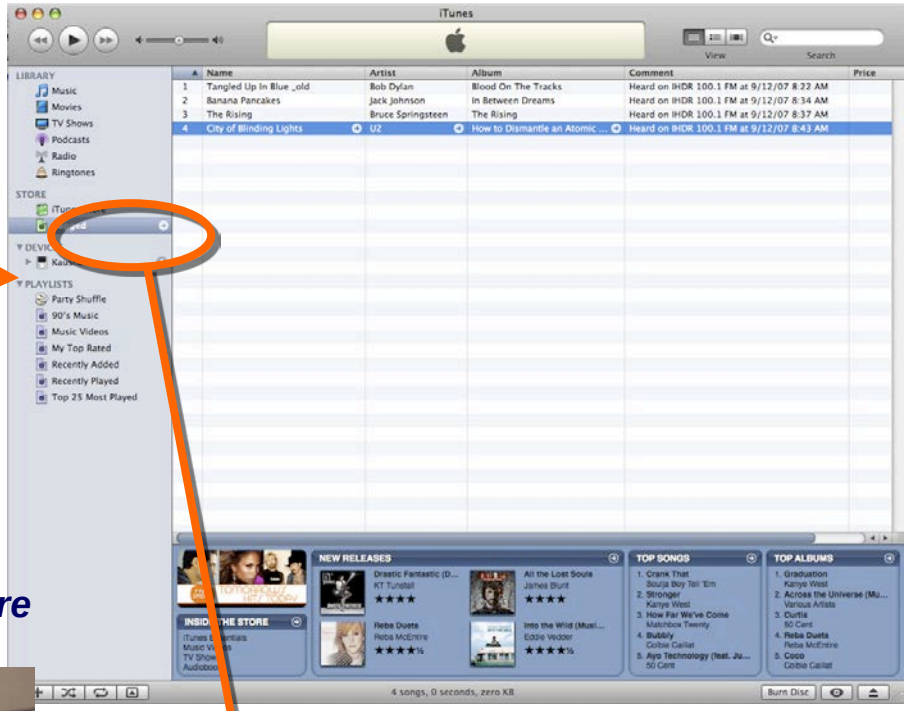
Digital Radio – Content Tagging

HARRIS

iTunes® Tagging

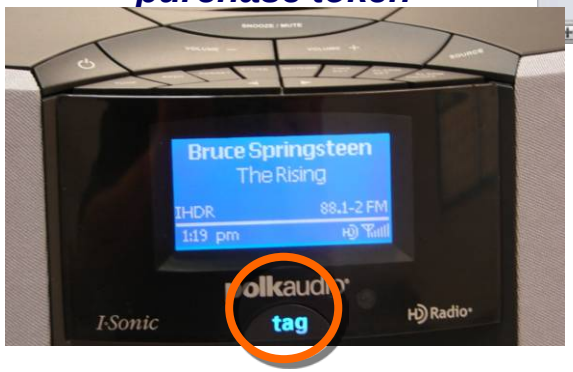
With HD Radio™ Technology.





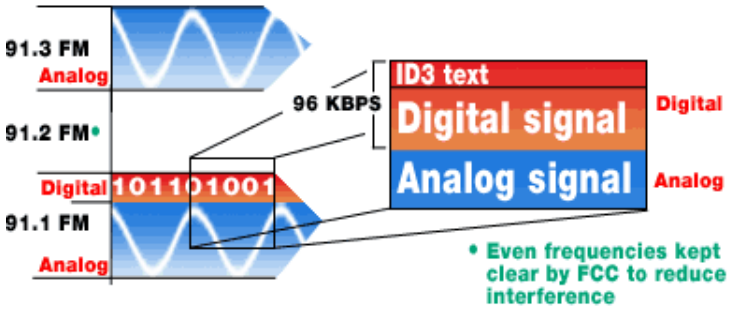
Broadcast unique song identifier

TAG it button to capture purchase token



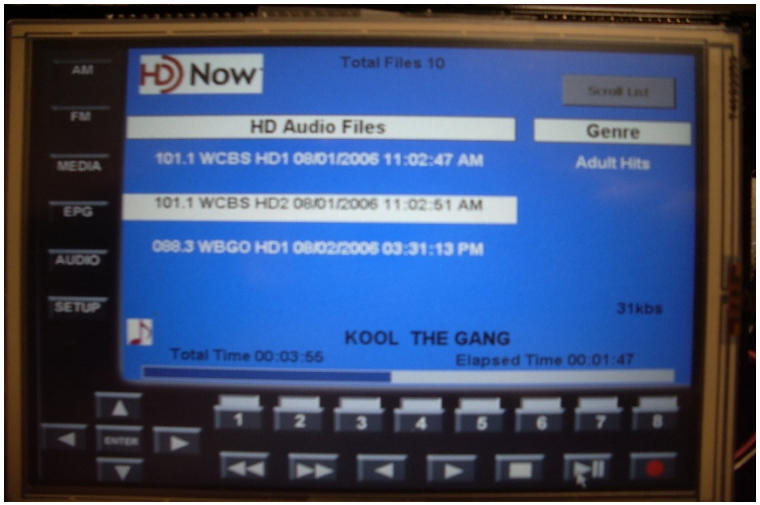
Ability to automatically review and purchase

Program Associated Data - DLS



- Supported on DAB, DRM and HD Radio
- Billboard in the dashboard for programming and advertising
- Very important for stations to deliver PAD-DLS: differentiates Digital Radio, consumers love the feature, necessary to match satellite
- Some stations have begun supplementing this feature with “more info” on the advertiser (e.g. tag line, phone number address)
- No bandwidth impact – included in the audio structure

Electronic Program Guide



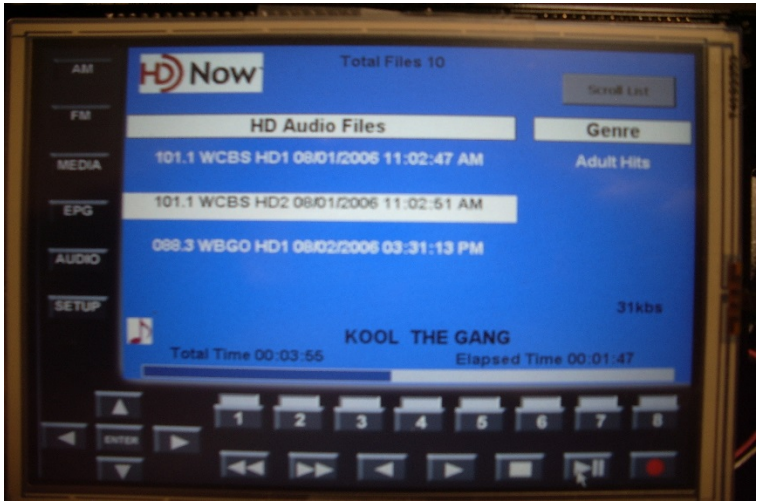
- Simplified multicast tuning
- Increase audience awareness
- Find what you want when you want it
- Program identification
- Set reminders
- Recording and time shifting
- Increased content management
- Bandwidth used 4-8kbps

Store and Replay

- Currently in use for DAB, proposed for HD Radio

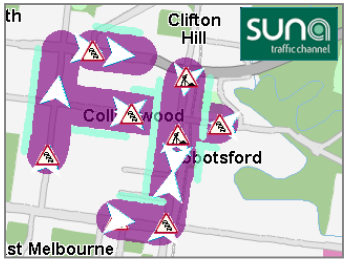
- Brings TiVO like functionality to radio
  - Schedule to record your favorite programs
  - Rewind to hear the contest number again

- Expand your audience with non real time listening
- No additional bandwidth



Digital Radio Revu – Audio Replay & Record

Traffic Information for Vehicle Navigation



- Australia DAB+ system
  - National Roads and Monitoring Authority Update shown on DAB+ Slideshow
  - Real time traffic camera stills - GPS updateable
  - Australian data traffic providers: suna traffic channel, RTA, AUSTRALIAN TRAFFIC NETWORK, SENTINEL CONTENT

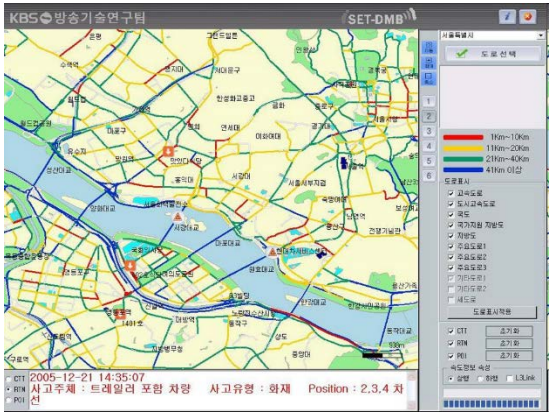
- Two service available in USA on HD Radio
  - Clear Channel – Total traffic network
  - Broadcast Traffic Consortium – Navtec
  - Both offer nationwide network

- Trafficmaster has launched a Digital Traffic Broadcast Service with Digital One in the UK
  - Enables DAB navigation devices to receive travel data
  - Trafficmaster network covers 95% of the country
  - Fully supports the TPEG standard from TISA

trafficmaster intelligent driving

Further Traffic Projects

- COOPERS (CO-OPerative SystEms for Intelligent Road Safety)
  - Innovative telematics applications on road infrastructure with the long term goal of “Co-operative Traffic Management” between vehicle and infrastructure using TPEG over DAB, to reduce the self opening gap of the development of telematics applications between car industry and infrastructure operators. This is a 48 month EC project.



Source: Bayerndigitalradio.de

Ability to deliver digital information that is unrelated to radio broadcast to various non-radio devices

Content

Traffic Data

Vehicle Database Updates (POI, Maps, Vehicle-Specific)

MOTION PICTURE ASSOCIATION OF AMERICA

Distribution

HD Radio
Pure Digital. Clear Radio.

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WORLD DMB
Digital Multimedia Broadcasting
Radio • Mobile TV • Multimedia • Traffic Data

Devices

Nav system

Multi-function radio

Smartphones

Set-top Boxes

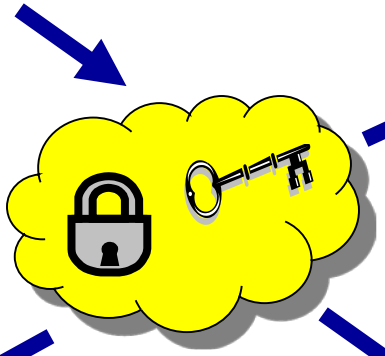
Electronic Tablets

PDAs

Digital Signage

Conditional Access

Content - Studio



Pay Audio Service

Mobile TV

Navigation Services

- Mix free content with subscription-based supplemental audio and data programming (pay per listen, pay per month, pay per update)
- Offer premium service
- Support subscription data services

Receiver A:
Existing Commercial Software

- HD Ch 1 – Free to air
- HD Ch 2 – CA audio service not recognized
- HD Ch 3 – CA audio service not recognized
- HD Ch 4 – Free to air

Receiver B:
Conditional Access & Entitled Receiver

- HD Ch 1 – Free to air
- HD Ch 2 – Authorized CA audio service
- HD Ch 3 – Authorized CA audio service
- HD Ch 4 – Free to air

Journaline Broadcasts

- Journaline at the Olympics
  - Audi, Fraunhofer IIS, Beijing Jolon, China Radio
  - Audi personal news: text, voice output, interactive, speech playback, personal profile, optimised for driving
  - Journaline: Hierarchical categorised, text information for digital radio, push store service
  - Types of content: News, sport, financial info, airport info, advertisements with red button technology
  - Presented digital radio in China, demonstrated news capabilities, back channel for interactive services

Broadcasts on air:

- Digital Radio Nord
- Bayern Digital Radio
- RTL Group (bce)
- RTL Italy
- Deutsche Welle
- DeutschlandRadio
- bit eXpress
- VTcom
- SWR
- ARD broadcasters, e.g. Bayerischer Rundfunk
- ROCKANTENNE
- Arqiva (UK)
- BBC World Service, .

Planning stage:

- Switzerland
- Italy
- China
- USA, ...

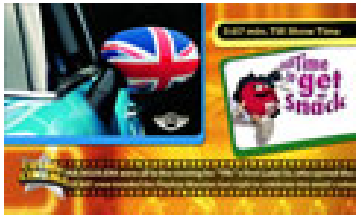
Mobile Multimedia Services – HD Radio

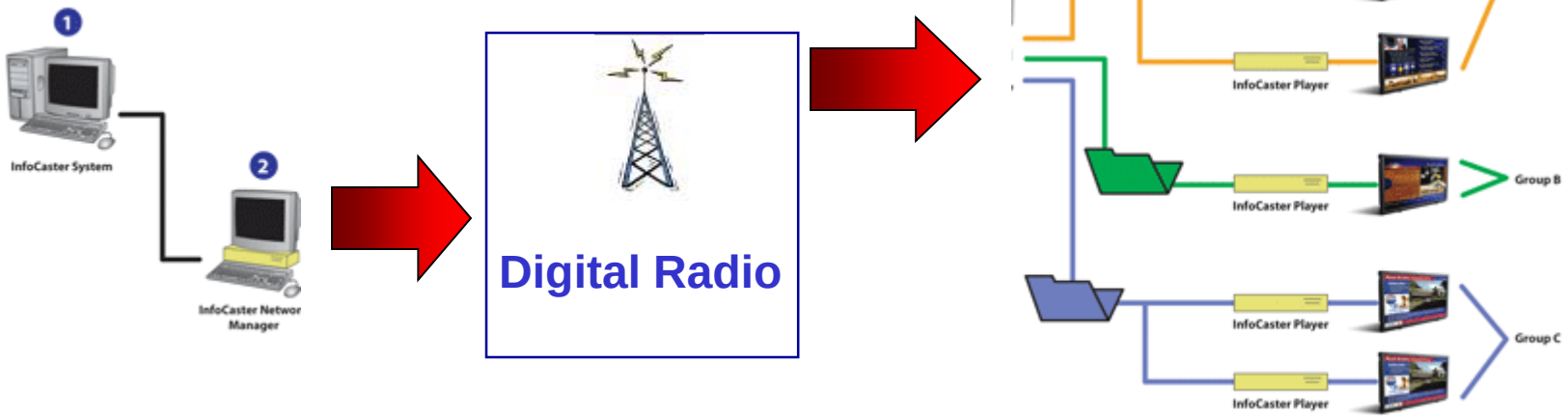
- Service offered
  - News
  - Weather
  - Sports Scores
  - Movie Times
  - Stock Quotes
  - Traffic (In Beta)
  - Daily Diversions
  - Horoscopes
  - Lottery
  - Downloadable Watch Faces

- Wide array of enabled devices planed
- Bandwidth ~10kbps

Digital Signage

- Deliver advertising messages to multiple locations via Digital Radio
  - Ideal for in store displays
  - Low cost – wide area distribution
  - Leverage existing advertising channels
  - Approximately 24kbps min.





Enhanced Digital Radio - Korea

SBS

Visual Radio Service

- CD quality audio service + Slow-rate Video
- BSAC Audio at 96 kbps: stereo 44.1 KHz Sampling (CD-like quality)
- H.264/MPEG-4 AVC at 64 kbps: QVGA[320*240], 0.5 frames/sec

Visual Radio

Slideshow

KBS

Audio & Data Services

- On-Air of Audio (MUSICAM) and DLS (Dynamic Label Segment), Slideshow

Data Services

- On-air of Traffic Information
- On-air of BWS (Broadcasting Web Site)

TPEG

MBC

Data Service

- On-air of Traffic and Travel Information (TPEG, Transport Protocol Expert Group

BWS

- The number of DMB users totalled 17.25 million at the end of 2008, up 59.9% from a year earlier
- Hundreds of DMB products available including navigation systems, in car entertainment systems, PDAs, mobile phones

- All DMB devices support digital radio
- 38.7% of the receivers in the market are navigation systems
- Majority of watch time during commute in car and on public transportation
- Time spent watching and subscriptions increased during the 2008 Olympics

Summary

- Consumers demand more and different types of content

- Digital Radio lowers deployment cost per channel
  - Advances in codec's enable more capacity
  - Balance with quality

- Digital enables new multimedia services
  - Traffic service shows high levels of interest
  - First profit centers may not be audio only

- Digital Radio as a mobile content delivery platform

- Digital Radio – It’s not just audio!

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