



Data Miniaturization For Telematics and Mobile Devices



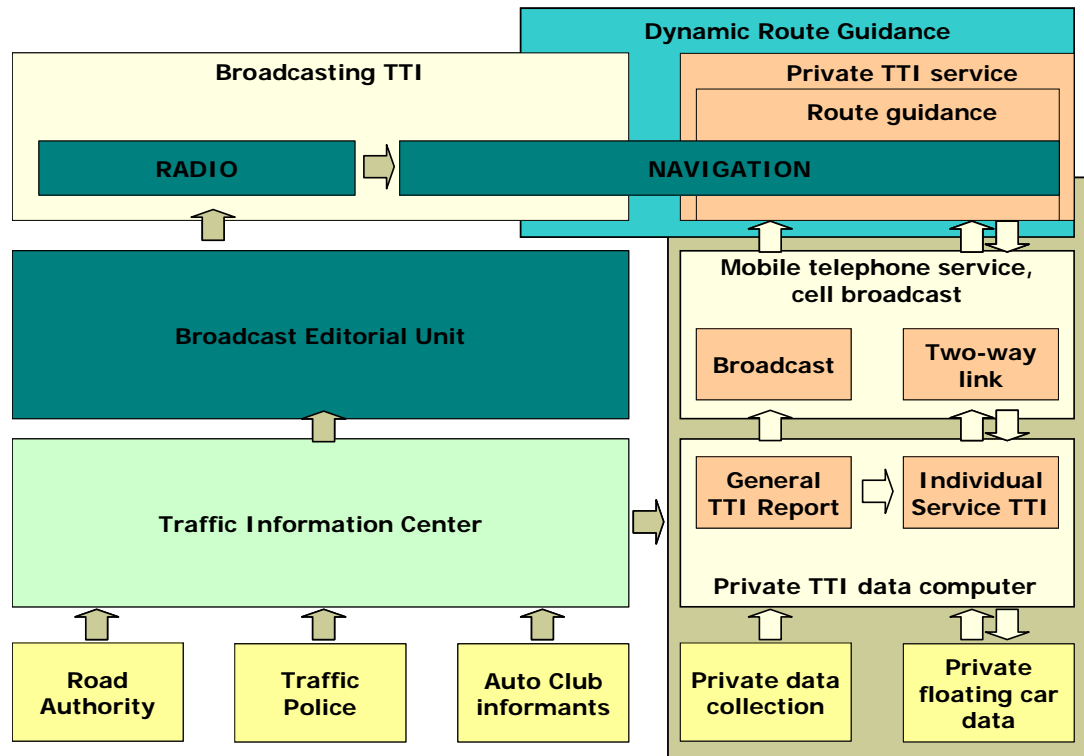
Agenda

- **Telematics delivery stages and performance challenges**
- **Introduction to Data Miniaturization (DM)**
- **Mobile data challenges & device solutions**
- **DM/OSGi integration opportunity**

Telematics Information Flow

Information Flow

- 5) In-car processing
- 4) Communication
- 3) Validation
- 2) Message generation
- 1) Data collection



Telematics Systems Challenges

- 5) In-car processing:** Real Time processing and response
Multiple communication sources
- 4) Communication:** Speed and cost of transmission
Error rates
- 3) Validation:** Complexity of validating multiple formats
- 2) Message generation:** Need to translate source formats to standards and tokens
- 1) Data collection:** Various source formats
Multiple data sources
Unknown future sources

Telematics Data Repetition

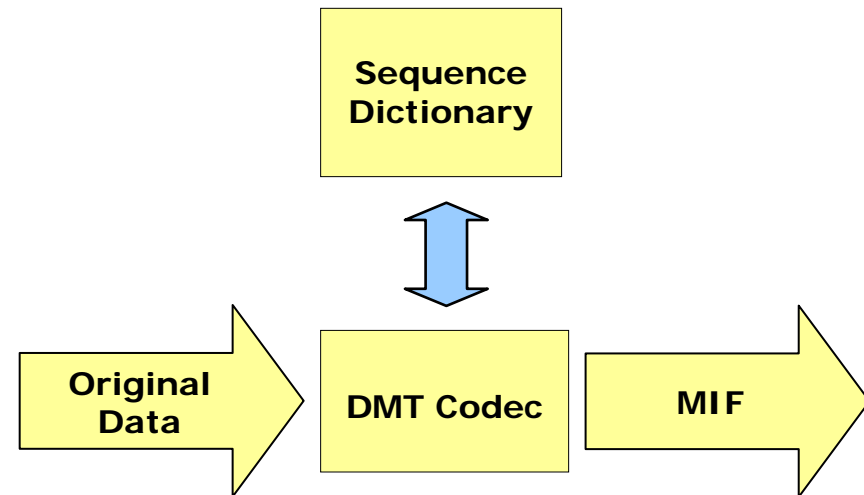
- **Telematics data contain sequences that are repeated over time**
 - Within individual streams/files
 - Across streams/files from common data sources
 - Across different data sources
- **Current approaches for addressing data repetition**
 - Compression: discovery of common sequences within individual streams/files only
 - Tokenization: replacement of longer (standard) sequences with shorter sequences

The DM Alternative

- **Data Miniaturization**
 - Original data transformed into Miniaturized Index File coupled with a Sequence Dictionary
 - Automated discovery, capture and use of repeated data sequences
 - Loss-less compression process
- **Full manipulation of data in the miniaturized form**
 - Data may be permanently Miniaturized
 - High-speed seek, search, edit, and display of any data element
- **Significant reduction in data footprint**
 - 30-90% reduction in data size
- **Improves performance across the system**
 - Reduced error susceptibility
 - Reduced transmission and storage costs
 - Faster response time

DM Process Flow

- **DM codec analyzes the original data**
- **Sequence Dictionary is created**
 - Dictionary organized according to the frequency of recurring data sequences in the sample file or stream
 - Sequence Dictionary able to be pre-loaded into vehicle
- **Encodes original data into a Miniaturized Index File (MIF) or Stream (MIS)**
- **MIF/MIS and Sequence Dictionary operate together to perform high-speed search, edit and display of the encoded data**





DM Technology Demo

Mapping & Text



DM Technology Demo Sequence Dictionary

Mobile Data Challenges

- **Data latency is impacting service adoption, usage and subscription prices**
- **Application and storage space are constrained**
- **Network costs are accelerating**



DM Application Demo

Mobile Devices



DM Application Demo

Multiple Data Formats

OSGi Telematics/Mobile Benefits

Store More Send Faster

- **GPS Navigation**
 - Increases device map storage capacity
 - Increases map delivery speed
 - Reduces communication error rates
- **Server/device management**
 - Increases XML/HTML storage capacity on space-constrained devices
 - Reduces XML/HTML synchronization time
- **Remote Computing**
 - Increases mobile database storage capacity
 - Reduces synchronisation time
 - Increases back-office data storage capacity
 - Increases data search and query speed
- **Search**
 - Increases XML/HTML/text storage capacity
 - Increases search speed

Potential DM/OSGi Integration

- **Multiple applications**
 - Communications (e.g. XML, BMP)
 - Database (e.g. SQL)
 - Search
- **Multiple platforms**
 - J2ME (javax.microedition.io)
 - Windows, Windows CE
 - Linux
 - BREW

DM Performance Perspective

- **Miniaturization performance**
 - Driven by data repetition, type and size
- **DM excels with repetitive data types**
 - XML / HTML, BMP, Text Databases, Text, Multi-GIF images
- **Performance scales with size**
 - Multiple files within the same data type
 - Large files (single and multiple large files)
- **DM has limitations with:**
 - Executables, binary files, small single file, single GIF images
 - Lossy applications (e.g. JPEG, MPEG, MP3)

DM/OSGi Issues Summary

- **Telematics**

- Multiple data formats and sources
- Near real-time requirements for data validation, transmission and processing

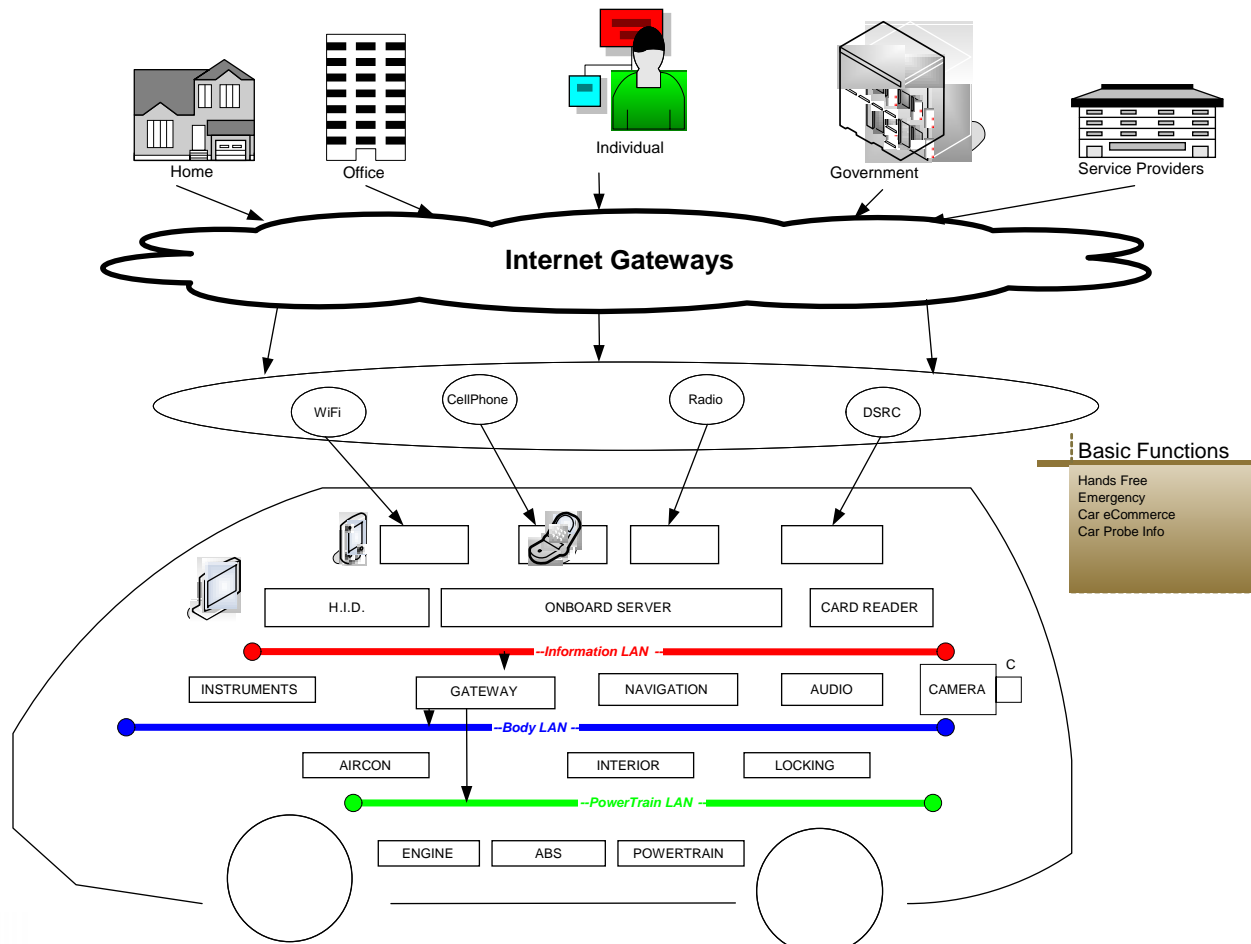
- **Mobile Devices**

- Data latency
- Network transmission costs
- Storage constraints on mobile devices

DM/OSGi Benefits

- **Data Miniaturization addresses both Telematic and Mobile Device storage and performance issues**
 - Data may be permanently Miniaturized
 - Full manipulation of data in the Miniaturized form
 - Patent filed in 1999
- **Key benefits**
 - Increases storage on new and legacy devices
 - Increases effective transmission speed
 - Reduces error exposure
 - Enables standardized output formats, leading to reduced complexity

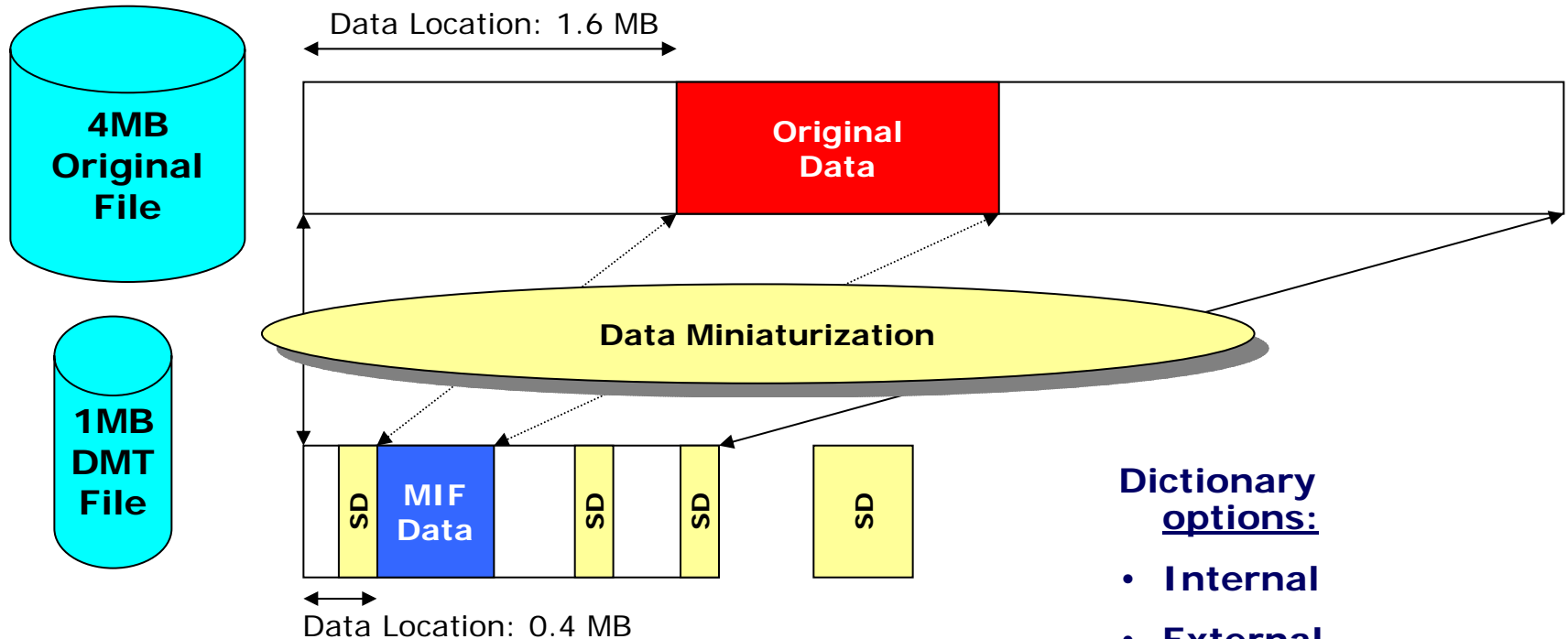
Back Up Slides



Basic Functions

- Hands Free
- Emergency
- Car eCommerce
- Car Probe Info

Data Transform Process



- Maintains an exact one-to-one relationship between data in the original file to data in the MIF file
- Original database is no longer required after the miniaturization process

Dictionary options:

- Internal
- External
- Both

WindSpring, Inc.

Background

- Founded in Queensland, Australia in 1996
- Migrated to California in December 2003
- Invented Data Miniaturization Technology – DMT
- Filed Patent in 1999, 10 Countries/Regions

Leadership Team

- Robert F. Mitro, Chairman
- Mark Arman, President and CEO
- John Archbold, CTO and Inventor
- Par Sheth, COO and VP Eng
- Alan Knitowski, Director
- Steve Liebeskind, Director
- John Thomas, Director

Data Miniaturization Technology

- DMT miniaturizes large databases for high speed search, retrieval and data transfer
- Enables data search, edit and display in the miniaturized state
- Works without changing existing data formats
- Prototype in 2003, FCS in March 2004