Control Solutions for the Automotive Sector

Munich

September 4 2007
Fujitsu Corporate Results FY2006

Consolidated Net Sales by Business Segment, including Intersegment Sales
FY 2006 Revenue by Business Segment*

Other Operations
- ¥490.4 billion (€3.1 billion)

Device Solutions
- LSI Devices
- Electronic Components
- Others
- ¥762.6 billion (€4.9 billion)

Ubiquitous Product Solutions
- PCs/Mobile Phones
- Hard Disk Drives
- Others
- ¥1,118.3 billion (€7.1 billion)

Technology Solutions
- System Platforms
  - System Products
  - Network Products
- Services
- ¥3,157.0 billion (€20.1 billion)

Note: Percentage breakdown for each segment is calculated as segment’s net sales / (total consolidated net sales + elimination). €1 = ¥157. FY 2006 is fiscal year ended March 31, 2007.
Capital Investment by Division

Since FY05 EDG Investment focused on Logic

(B Yen)

EDG
407 B Yen
(~ 2.6 B EUR)
(48% of total)
since 2005
Wafer Fab Location & Capacity Update

- Mie Fab No. 1 (90nm) 15k wafers/month. Mie Fab No. 2 (65nm) ramping from July 2007.
- Mature technology capacity (>0.13μm) increased from 80k to 110k wafers (8" equiv.)/month after acquisition of former Spansion Factories in April 2007
Electronic Devices Strategy

- New Integrated Device Manufacturer IDM Model
  - Flexible customer engagement from pure COT to Full Custom

- 2 Pillars for Logic Growth
  - Leading Edge Technologies – highly differentiated process for low leakage ASIC/ASSP
    - Target markets: Digital Consumer, Mobile, High-End Computing, High Graphics, Communications
  - Mature Technologies for long-term stable business mainly on MCU
    - Target markets: Consumer, Automotive, Industrial

- Partnering key element of strategy
FME Strategy

- Strategy to target main market segments where Europe drives the innovation
  - Automotive
  - Multimedia
  - Communications
  - Industrial

- Within Automotive, **Driver Information** is a key segment for growth and innovation where Fujitsu has strong track record
  - All European first tiers are among customer base
  - All European car makers use Fujitsu silicon in some of their models in Driver Information
Charter of local R&D

- Be close to the innovation drivers, sense the trends
- Co-create within the Innovation Eco system - Partnering
  - Car Makers, 1st Tiers, IP providers, Software companies, Semiconductor companies
- Bring Fujitsu’s know-how to architecture definition and future standards

... Today’s announcement is a step along that road ...
Conclusion

Fujitsu plans to support the Inova APIX interface in future Graphic Display Controller and Microcontroller products with the objective of driving new standards for automotive applications.

BMW intends to adopt it in their next generation.

Fujitsu is helping to reshape the future of vehicles.
Mission: Drive MCU business for Europe’s key markets Automotive and Industrial

Founded in 1997 it now employs 65 own and 25 external engineers for
- MCU chip development
- MCU software product development
- MCU application support
- MCU automotive marketing

Developed > 120 MCUs and ASSPs

Key automotive applications are driver information, body control and comfort, chassis

Located in Langen (south of Frankfurt)

Fujitsu’s Concept for MCUs:
- Proven Fujitsu cores 16LX, 16FX, 32-bit FR
- Proven in-house technology and fabrication
  Proven quality, AEC-Q100, Dual-fab. strategy
  Long-term availability
- Temperature range -40 to +105°C/+125°C
Network Protocols in Automotive

- FlexRay
- CAN
- LIN
- BEAN
- J1850
- VAN
- TTP/C
- Intellibus
- APIX
- Infotainment
- IDB1394
- Time Triggered
- High Speed Body Electronics
- Low Speed Body Electronics
- MOST
- D2B
- Bluetooth
- WLAN
# Automotive Communication Protocols

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<thead>
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</thead>
<tbody>
<tr>
<td>Topology</td>
<td>Bus - Linear</td>
<td>Bus - Linear, Star</td>
<td>Bus - Linear, Ring</td>
<td>Bus - Linear, Ring</td>
<td>Point-to-point</td>
<td></td>
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<tr>
<td>Harness</td>
<td>UTP</td>
<td>UTP (~20 m @ 1 Mbps)</td>
<td>UTP, STP (20 m)</td>
<td>POF (100 m)</td>
<td>UTP (~20 m)</td>
<td>POF (50 m)</td>
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<tr>
<td>Area of use</td>
<td>Control low-end</td>
<td>Control high-end, Safety-relevant</td>
<td>MM-networks</td>
<td>MM-networks</td>
<td>Display, Camera</td>
<td></td>
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<tr>
<td>Fujitsu Products</td>
<td>Large 8-, 16-, 32-bit MCU portfolio</td>
<td>Large 16-, 32-bit MCU portfolio, GDC</td>
<td>MB88121B, MB91460X</td>
<td>GDC Integrated 32-bit MCU under dev.</td>
<td>MB88387 Integrated versions. under dev.</td>
<td>Planned on 32-bit MCU, GDC</td>
</tr>
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Automotive MCU Example

- Open Standard Communication Protocols are integrated in MCUs
- Low-end protocols integrated in 16-bit MCUs, high-end in 32-bit MCUs
- Hierarchical networks including Gateway-MCUs
- Typical MCU is Fujitsu MB91460-family (20 derivatives av. and under development)
Display System Architecture

- Typical architecture with two separated units
  - Control unit
  - Display unit
  - Connection via APIX

- MCU control via APIX side-band link
- Pixel data via APIX main-band link
The GCC: is a dedicated team representing all necessary skills for local GDC definition: hardware and software development, marketing, sales and AE support.

GCC core team: currently 30 people  
(HW & SW development, AE support, Marketing&Sales)

GCC Mission: Be number ONE in embedded automotive Graphics

Located in Neuried (southwest of Munich)

Fujitsu’s Concept for Graphics Controllers:

Targeted for embedded (automotive) applications

Scalable approach : binary compatible GDCs

Long term availability (typ. 7 years)

Dual fab strategy with latest technologies (90nm)

Temperature range -40 to +85°C/+105°C
Fujitsu offers specialised solutions for automotive display based systems: Instrument cluster displays, head units (incl. dual view), head-up displays, night vision, blind spot, entertainment systems, ...

Growing market, with Europe as most attractive marketplace

European OEM Navigation Systems

Source: IMS Research “Automotive Navigation Report 2007” and FME project db
Evolution of Automotive Displays

<table>
<thead>
<tr>
<th>Year</th>
<th>Resolution</th>
<th>Dot-Clock</th>
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<tbody>
<tr>
<td>1996</td>
<td>320x240</td>
<td>8MHz</td>
</tr>
<tr>
<td>1998</td>
<td>640x480</td>
<td>28MHz</td>
</tr>
<tr>
<td>2000</td>
<td>800x480</td>
<td>36MHz</td>
</tr>
<tr>
<td>2002</td>
<td>1280x480</td>
<td>60MHz</td>
</tr>
<tr>
<td>2004</td>
<td>1600x600</td>
<td>100MHz</td>
</tr>
<tr>
<td>2006</td>
<td>Dualview</td>
<td>?</td>
</tr>
<tr>
<td>2008</td>
<td>1280x480</td>
<td>60MHz</td>
</tr>
<tr>
<td>2010</td>
<td>1600x600</td>
<td>?</td>
</tr>
<tr>
<td>2012</td>
<td>1600x600</td>
<td>?</td>
</tr>
<tr>
<td>2014</td>
<td>1600x600</td>
<td>?</td>
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High End GDC Example

- Graphics Controllers are typically ‘High pin count’ devices
- E.g. MB86297 ‘Carmine’ has ~ 290 functional pins (plus Vcc, GND)
- Why not use serial display link for automotive up to now?
  Because no standard exists!

Graphics Processor

- Geometry Engine
- Rendering Engine
- Video Capture
- Display Controller
- CPU I/F (PCI 66MHz)
- Memory Controller (DDR 266bps)
- Graphics Local Bus
- Bus Matrix (266MHz)

19 pins
44 pins
48 pins
64 pins
109 pins

To be replaced by PCIe express soon

Typical: 2x 1280x480 (2x 60MHz dotclock)
Integration Examples
Fujitsu

The possibilities are infinite