MOST150 – The Next Generation Automotive Infotainment Backbone

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In-Car Infotainment Trends

Number of Multimedia Components in Daimler Car Platforms:

- More and more features and components per car
- Introduced in luxury segment but migrating into mid and low range
- Components increasingly interact to provide higher value features
- Issues with that:
  - Need for extensive exchange of signals
  - Complexity and weight of cabling
  - Avoiding Electromagnetic Emissions becomes more complex
- Flexible and powerful communication backbone needed!

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* Predecessor Model (500 SE)
Our Next Generation Connectivity Vision

- **MOST as Infotainment Backbone**
  - High QoS Audio, Video, Data and real-time Control over a single medium
  - Standard controlled by car makers and developed for their needs
  - Optimized for automotive environment (EMC, temperature, reliability)
  - Big peer-to-peer networks possible

- **Ethernet as Diagnosis and SW Download Interface**
  - Optimized for packet communication
  - Simple adaptation to repair shop IT infrastructure
  - Not active while driving (limited suitability for auto environment)

- **USB as Consumer Connectivity Port**
  - Simple Plug&Play
  - Integrated battery charging
  - Cabling ideally only by user (limited suitability for auto environment)
  - Port and no network

- Seamless connectivity between the different networks
MOST – The Multimedia Network
Data Transport – MOST150 Frame

- Synchronous mechanism
- Cyclic continuous repetition of Frames
- Unused bandwidth is available for Ethernet packets
The MOST Cars from 2001 to 2008

- Since the first vehicle was introduced in 2001:
  - 55 car models in production
  - First vehicle of Toyota launched with MOST50
  - Hyundai & Kia select MOST for first vehicle models
Focal Points of MOST Development

- Ongoing technology development since first SOP:
  - Increase of Robustness & Ease of Use
  - Realization of Cost Down
  - Increase of Network Speed
  - Realization of Video over MOST
  - Addition of High-Speed Data over MOST

- Requirement discussions within MOST Cooperation
INIC Architecture – Key Benefits

- Self-contained quick start-up of network node – independent of (slow) application startup
- Protection of system against failures of individual application through network protected mode
- Less possibility for application to corrupt network function due to high-level INIC API and encapsulated network management
- Simple design-in, lower verification effort and quicker time to market
Focal Points of Cost Reduction

1. NIC/INIC
2. FOT + Connector
3. Peripherals
4. Application Connectivity
Longer Term Cost Optimization - iFOT

- Encapsulation of complete network function „in the header“ (iFOT)
- Very low number of variants are used in high volume
- Production by several foundries/fabs
- Cost-Down through volume production and optimization of value chain
MOST IP Licensing

- Data Link Layer of MOST has been developed by Harman/Becker and SMSC before and outside of MOST Cooperation
- Its specification had not been opened and is not part of MOST Cooperation
- Oct. 1st 2007, Harman/Becker and SMSC:
  - Have opened MOST25 Link Layer specification and offer CAN-like Protocol IP license
  - This allows other IC makers to do their own interoperable MOST ICs (own design)
  - Provided roadmap for IP opening for new generations of MOST with market growth
- SMSC offers MOST25 Design IP licenses for integration on SoCs that broaden the market (using SMSC’s design)
Overview MOST Network Interface Controller

MOST Intelligent Network Interface Controller (INIC)

- OS81110
- OS81082
- OS81050
- OS8104
- OS8104A

INIC150
INIC50
INIC25

- OS81120
- OS81092
- OS81060

Cost Down

Available
Upcoming

MOST NIC
MOST Classic
MediaLB – The Multiplex Interface

- Synchronous Audio/Video
- Isochronous Audio/Video
- Packet Data Services
- Real-Time Commands
- Clock
- Supports all speed grades!

INIC
3-Pin MediaLB Interface
MOST Network Interface
MediaLB Products (44 Products)

16 Products with MediaLB support available in 2007

- **MPC5533/34/53/54/65/66, MPC5567 (Tiger)** (1) Gateway-Processor
  http://www.freescale.com/webapp/sps/site/prod_summary.jsp?code=MPC5567&nodeId=0162468H3bTJG0325&lid=Alp5567
- **MPC5514/17** (2) Dual-Core Processor for Gateway, Display, Dashboard
- **MB86R01 (Jade)** Graphics Processor for Car Navigation and Display Appl.
- **V850E/CAG-4M (Cargate-M)** Gateway-Processor
- **Parrot5** ASIC for Navigation, Car Multimedia and Telematics
  http://www.parrot.biz/uk/oemsolutions/parrot5
- **OMAP** Processor for Automotive Infotainment
  http://focus.ti.com/docs/pr/pressrelease.jhtml?prelId=sc05141
- **TX4961/62 (Capricorn-M/-L)** Graphic Processor for Display and Graphic Appl.
  http://www.toshiba-components.com/prpdf/5635E.pdf
- **Altera FPGA’s** FPGA Makro for Automotive Infotainment
- **SMSC IP for FPGA’s** VHDL implementation on Xilinx FPGA for Automotive Infotainment
  (e.g. XILINX Spartan-II)
  http://www.smsc-ais.com/AIS/content/view/466/440/

More than 4 Customer Specific Products with MediaLB support available in 2007 from

- **RENE S**
- **HARMAN/BECKER AUTOMOTIVE SYSTEMS**
- **Panasonic**
- **OKI**

More than 24 new Products are in development with MediaLB support from

- **TOSHIBA**
- **NEC**
- **FUJITSU**
- **Freescale**
- **TX INSTRUMENTS**
- **Renesas**
- **Harman/Becker Automotive Systems**
- **Panasonic**
- **OKI**
- **Hyundai**
- **Mitsubishi Electric**
- **KETI**
- **XILINX**
- **NXP**
- **Texas Instruments**
- **Freescale**
- **Fujitsu**
- **Nissan**

Notes:
(1) SW-Emulation via eTPU
Runs on all MPC55xx with eTPU
(2) SW-Emulation via 2nd Core
Runs on all MPC551x with 2nd Core
Evolution of Features and Use Cases

**MOST Evolution**

- Evolution of Features and Use Cases

**Bandwidth (MBit/sec)**
- 2003: 25
- 2007: 150
- 2009+: 200

- 16 audio channels
- + navigation graphics
- + DVD audio/video
- + DVB-T
- + discrete multi-channel audio streaming
- + electrical physical layer
- + transparent Ethernet transport channel
- + IP based applications
- + full featured WLAN support
- + high speed SW download capability
- + isochronous channel
- + multiple video streams incl. cameras
- + HD-Video content
- + next generation optical physical layer
MOST150…

- Physical layer
  - MOST150 can use same wire harness and connectors as MOST25!

- Bandwidth
  - MOST provides premium QoS with high bandwidth efficiency!

- New MOST Ethernet Packet Channel
  - Transparent transport of Ethernet Frames
  - Addressing via IEEE Ethernet MAC address
  - All types of IP communication possible
    - MOST150 is the auto grade Physical Layer for Ethernet!
Summary New Features of MOST150

- Optimizations of **CONTROL** communication:
  - Double bandwidth

- Extended support of **AUDIO**:
  - Isochronous channels with Constant Rate Streaming for tunneling non-synchronized audio (saves SRCs)

- Seamless and cost effective support of **VIDEO** transmission:
  - Isochronous channels with Burst Rate Streaming (e.g. transport of MPEG streams)
  - Transport Stream Interfaces for glue-less low cost connectivity to video ICs

- Extended support for high-speed **DATA** transmission:
  - Direct support of Ethernet packets and MAC addressing
  - High speed SPI interfaces
  - Isochronous channels with Packet Streaming – private QoS channels for IP streaming
Thank you very much for your attention.