



Software Solutions

Satish Premanathan

Principle Consultant, Wipro Technologies

I394SMAUTO IEEE 1394 Software Solutions

1 IEEE 1394 based Automotive Software stack 

2 Automotive Software stacks – Use Cases 

3 Enabling I394 Automotive Ecosystem 

4 Microsoft Auto

5 Other case examples 

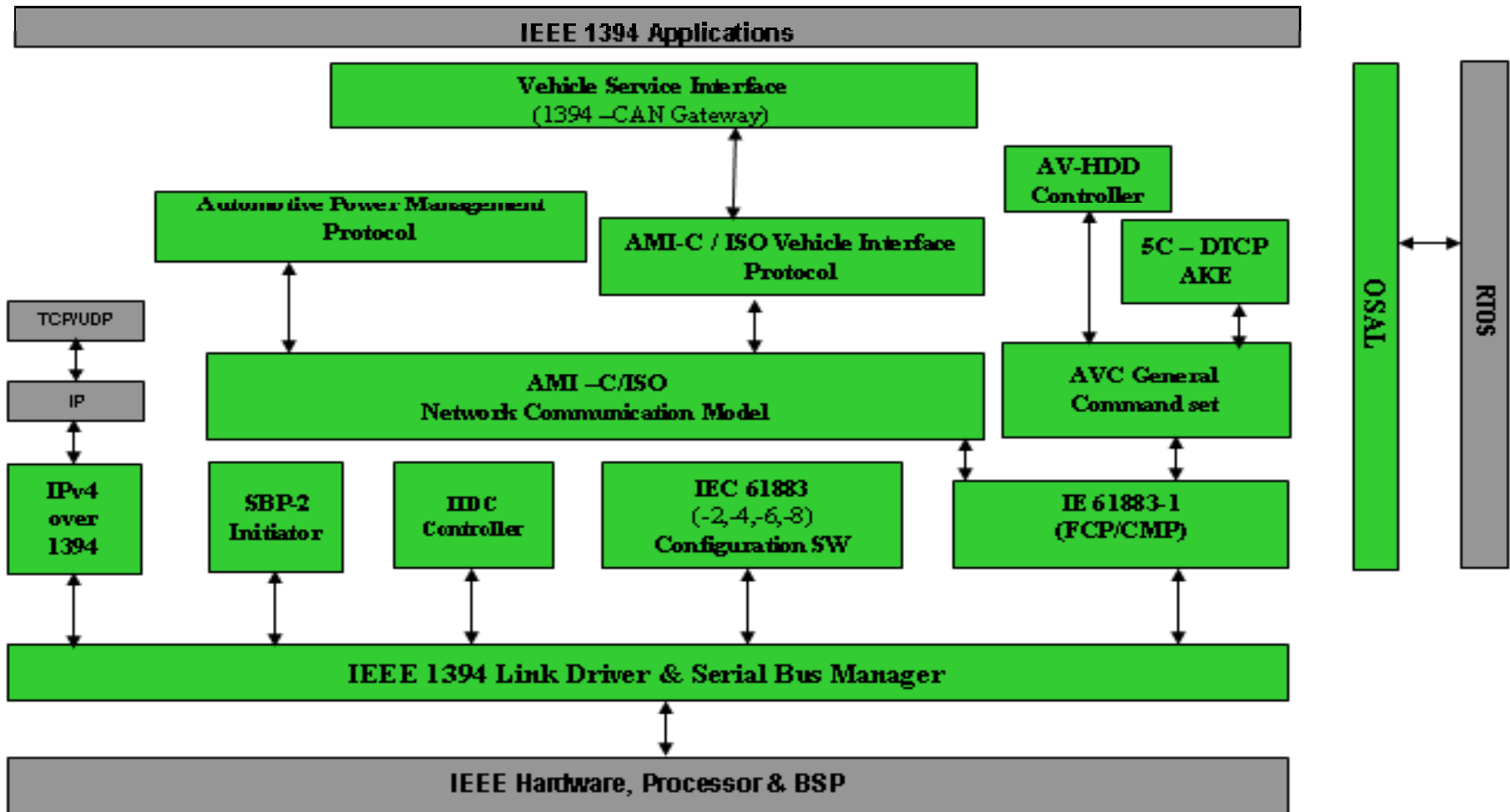


① IEEE 1394 based Automotive SW stack



- Overview and Wipro's Offering



I394SM AUTO Software Applications Offerings



Legenda

-  I394's Software IPs Available Now
-  External modules



① Automotive SW stack – Use Cases

- Automotive Requirements – Key Design Criteria
- Automotive Use Cases / Applications
 - Use Case 1- Car Navigation System
 - Use Case 2- Rear Seat Entertainment
 - Use Case 3- Camera based Driver Assist System
 - Use Case 4- In-vehicle Internet Connectivity
 - Use Case 5- Portable CE Device Connectivity



Automotive Requirements – Key Design Criteria

- ◉ **Key design criteria for protocol stack software design for Automotive compliance –**
 - **Initial start up time**
 - Should be in-line with start up timing requirements specified by OEMs
 - **Efficient and deterministic memory pool and buffer management**
 - Especially when dealing with Isochronous transmission / reception
 - **Robust handling of Bus Reset Interrupt**
 - **Power Management**
 - Support for multiple power states and power consumption requirements applicable in Automotive environment
 - Should be able to harness the underlying Hardware's Power management capability efficiently
 - **Network/Resource Management**
 - Isochronous channel and bandwidth allocation / de-allocations
 - Protocol specific – AMI-C/ISO I-Num allocation / de-allocations
 - Robust Error handling and error recovery under all conditions
 - **Portability and scalability**
 - OS independence by means of having an Operating System Abstraction Layer
 - Platform Independence by means of segregating hardware and processor dependent codes

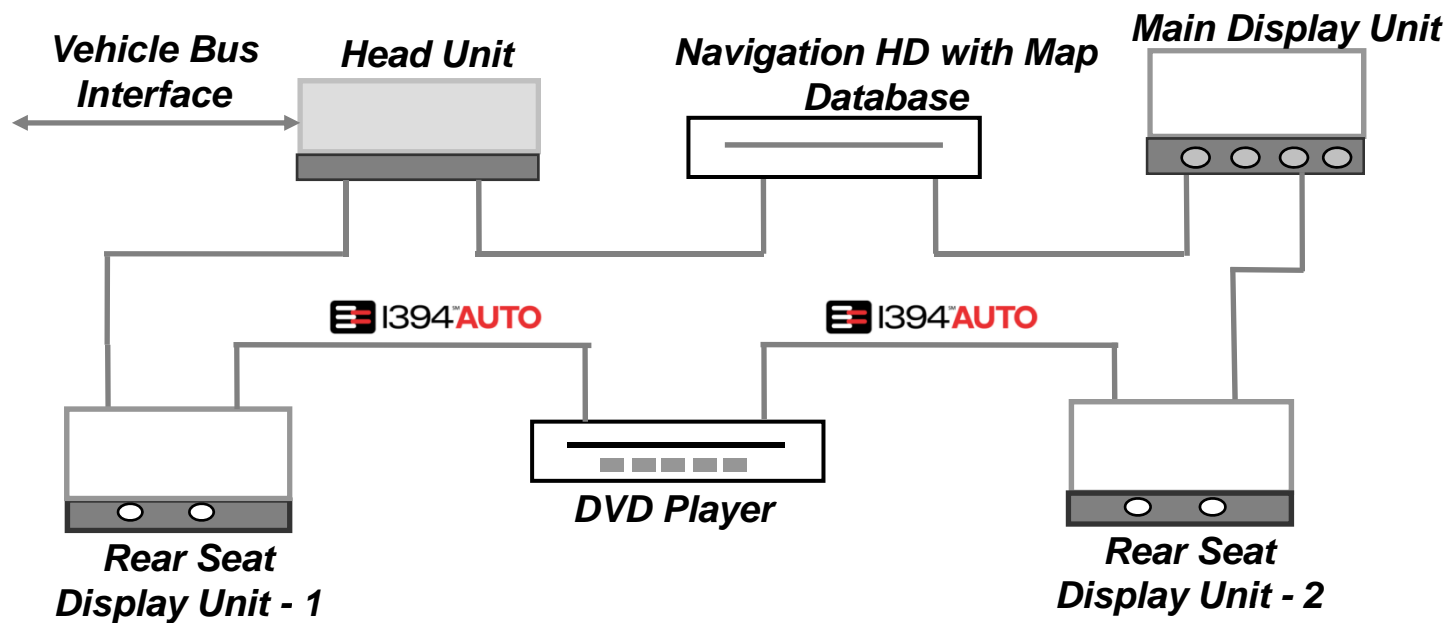


Use Case 1- Car Navigation System

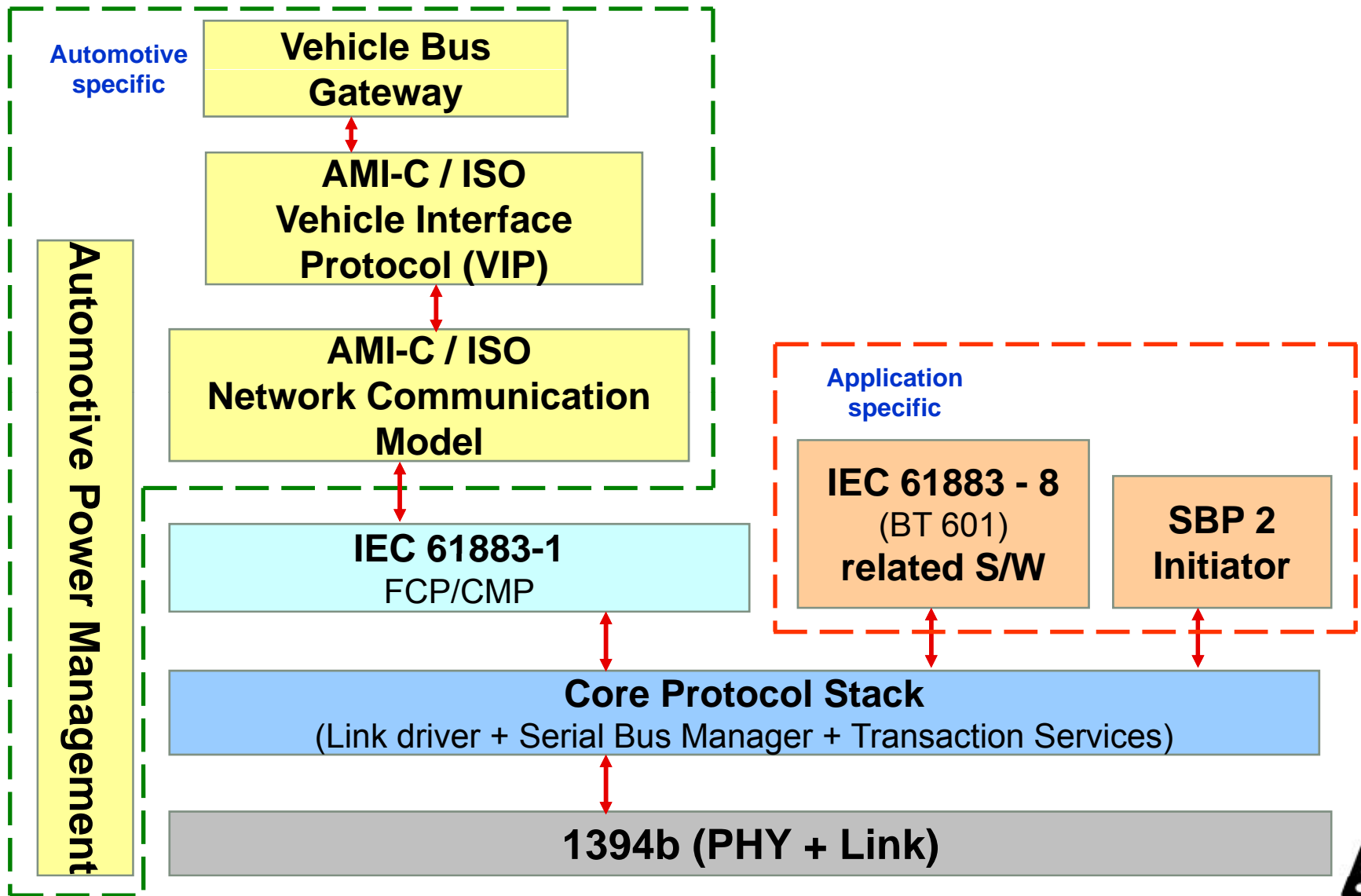


Use Cases

- Transfer of Map data from Navi HD to Head Unit
- Transfer of Map Display frames (YUV format) to Remote Display



Use Case 1- Car Navigation System



1394 AUTO

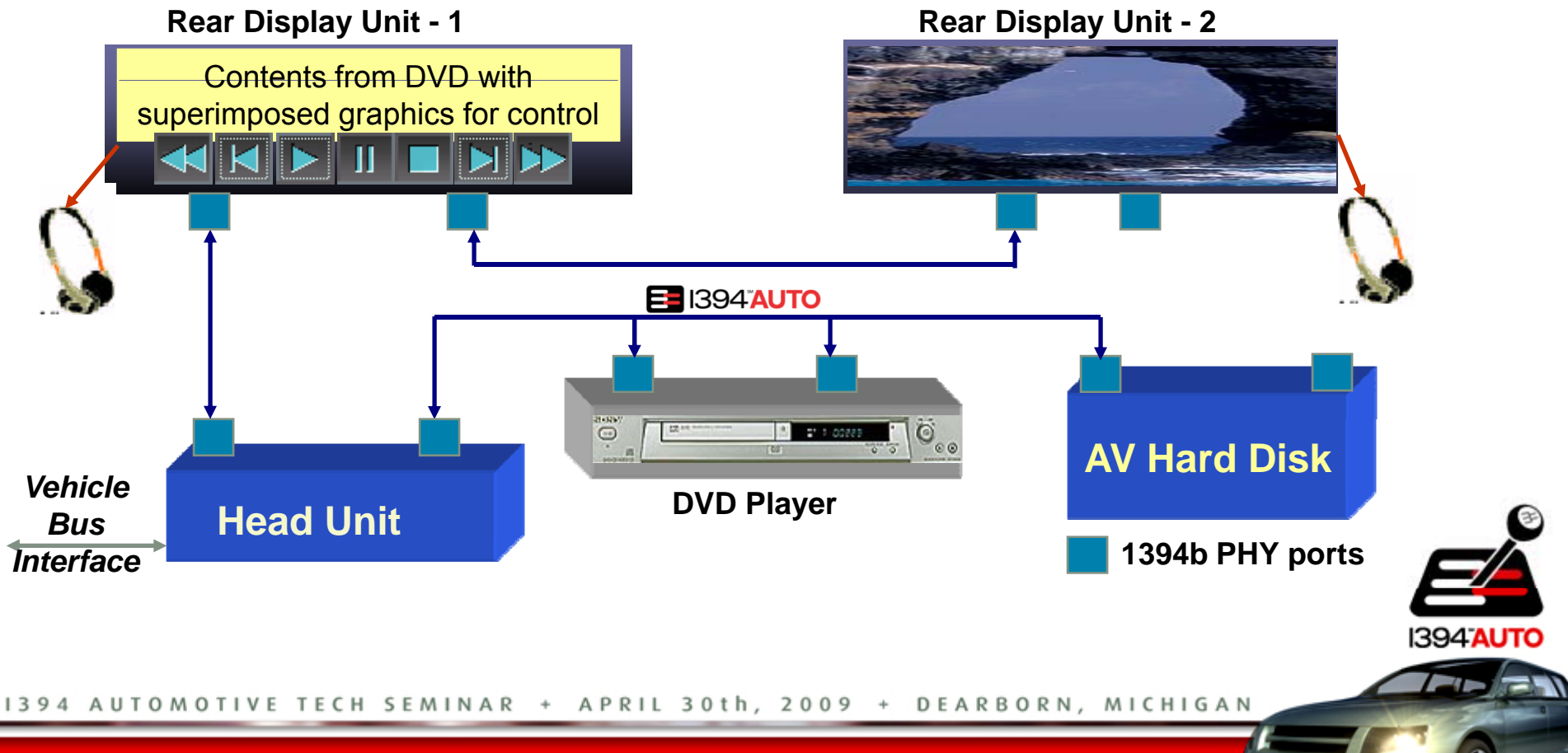


Use Case 2- Rear Seat Entertainment

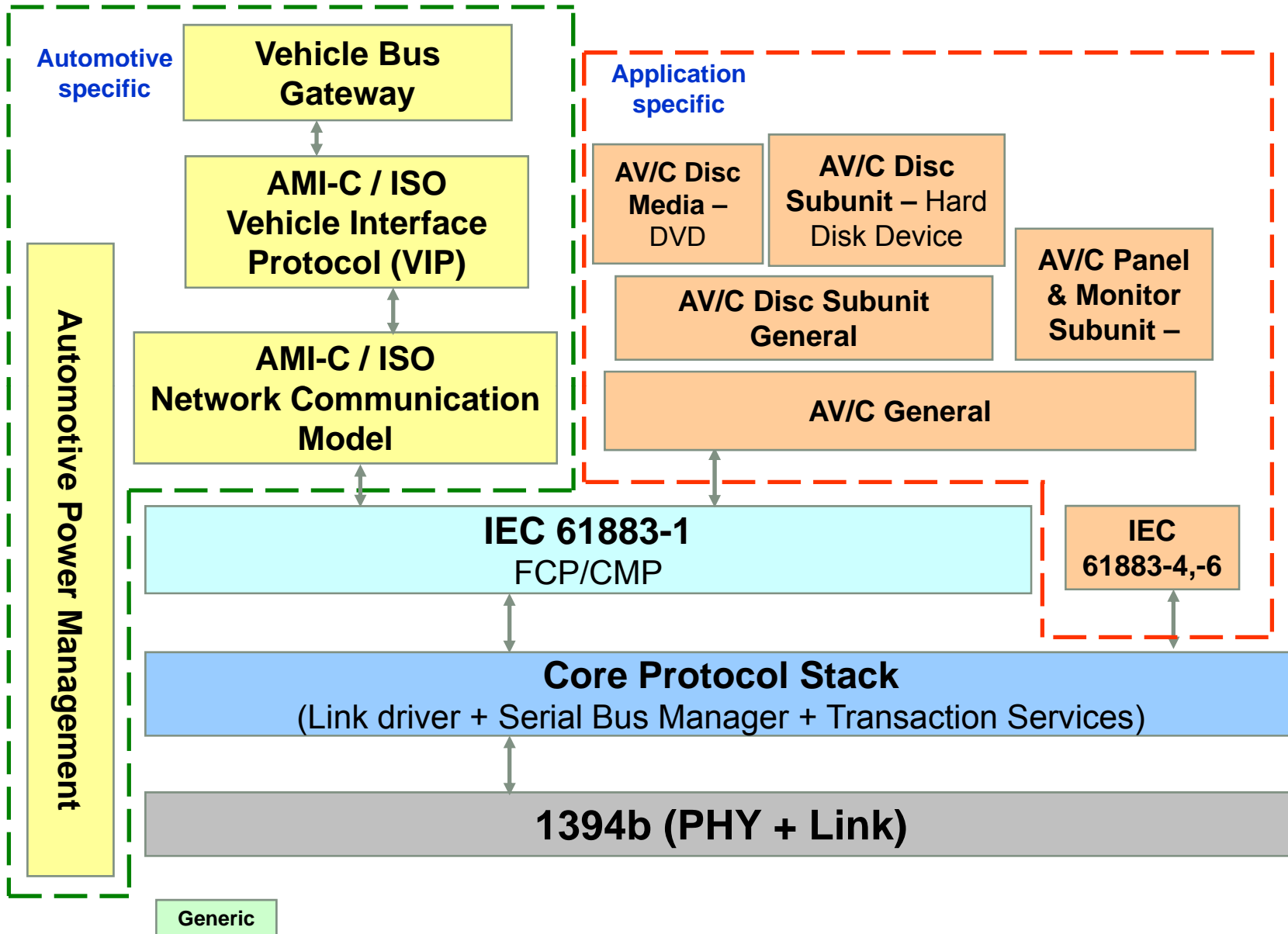


Use Cases

- DVD and AV-HDD playbacks controlled by Head Unit and DVD content streamed to Rear Display Unit - 1 and AV-HDD content streamed to Rear Display Unit - 2



Use Case 2- Rear Seat Entertainment

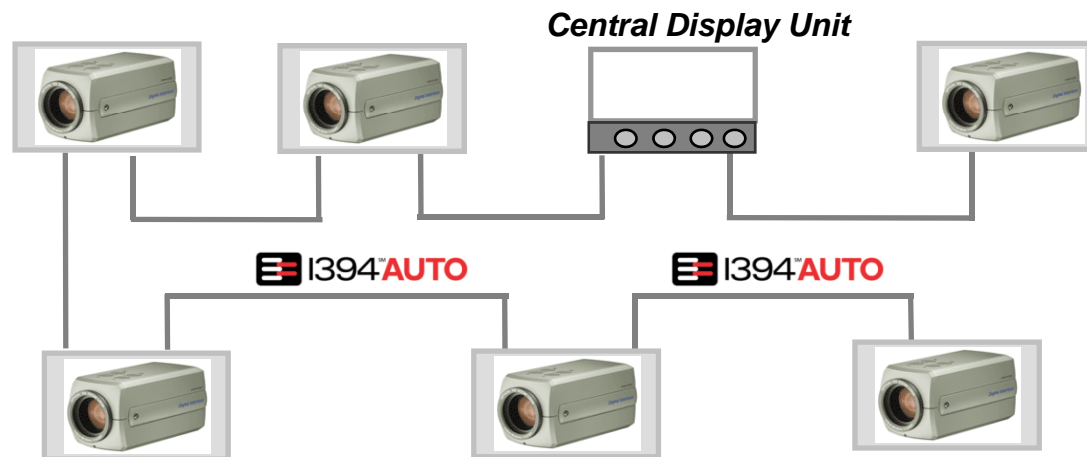


Use Case 3- Camera based Driver Assist System

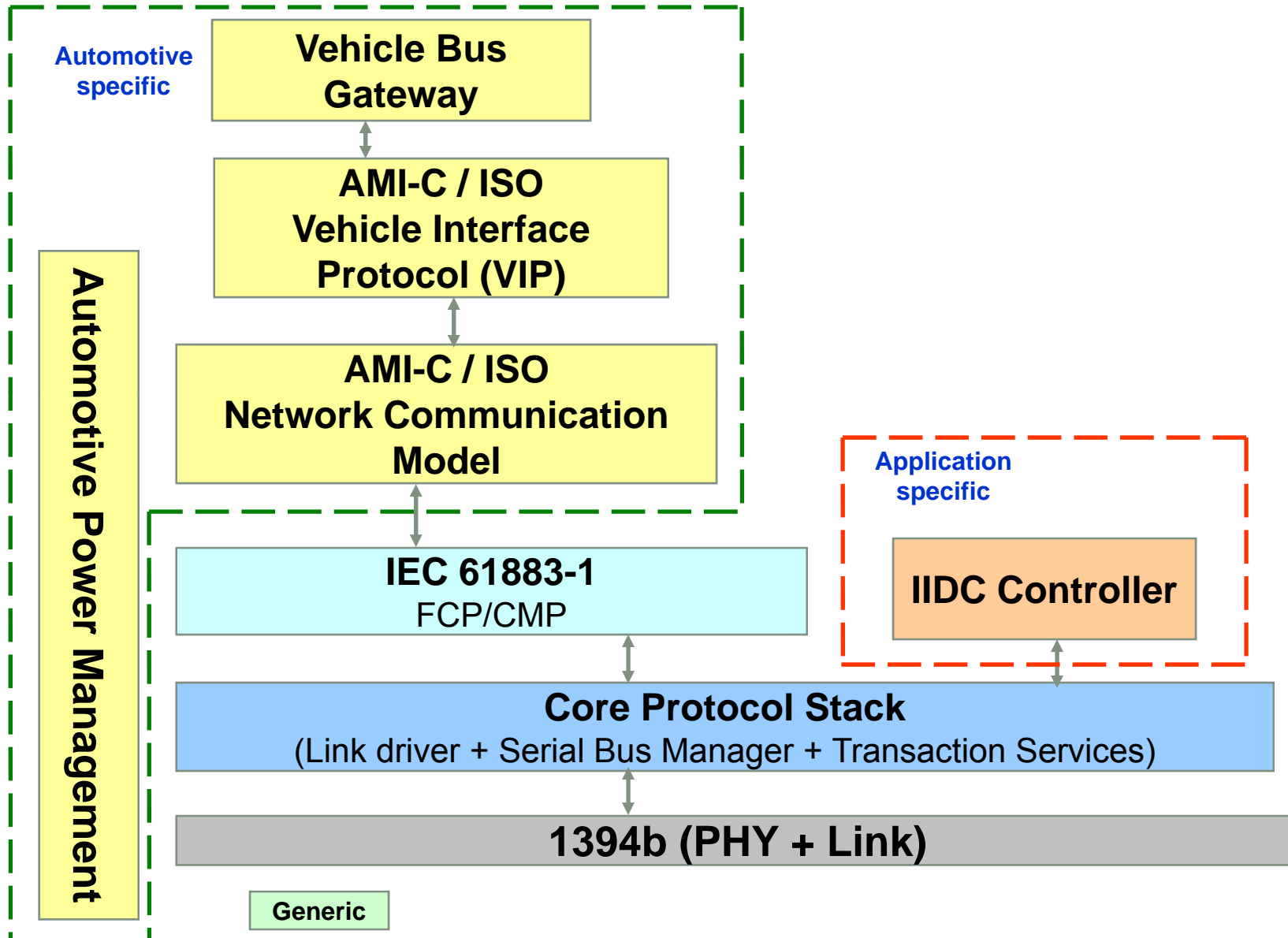


Use Cases

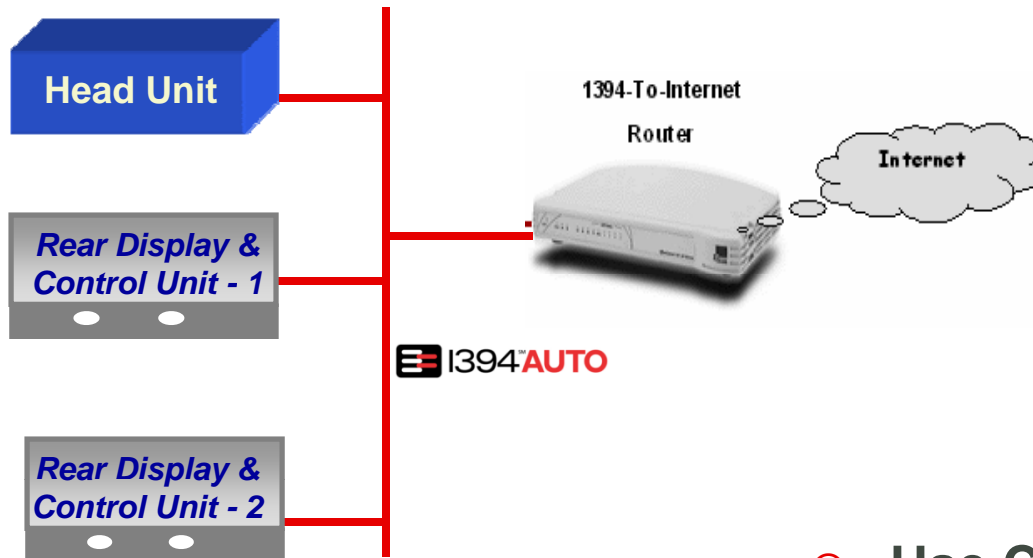
- Multiple IIDC Cameras streaming raw video to Main Display Unit for an all-around view of vehicle periphery
 - Park Assist, LDW, Blind spot monitoring, etc



Use Case 3- Camera based Driver Assist System



Use Case 4- In-vehicle Internet connectivity

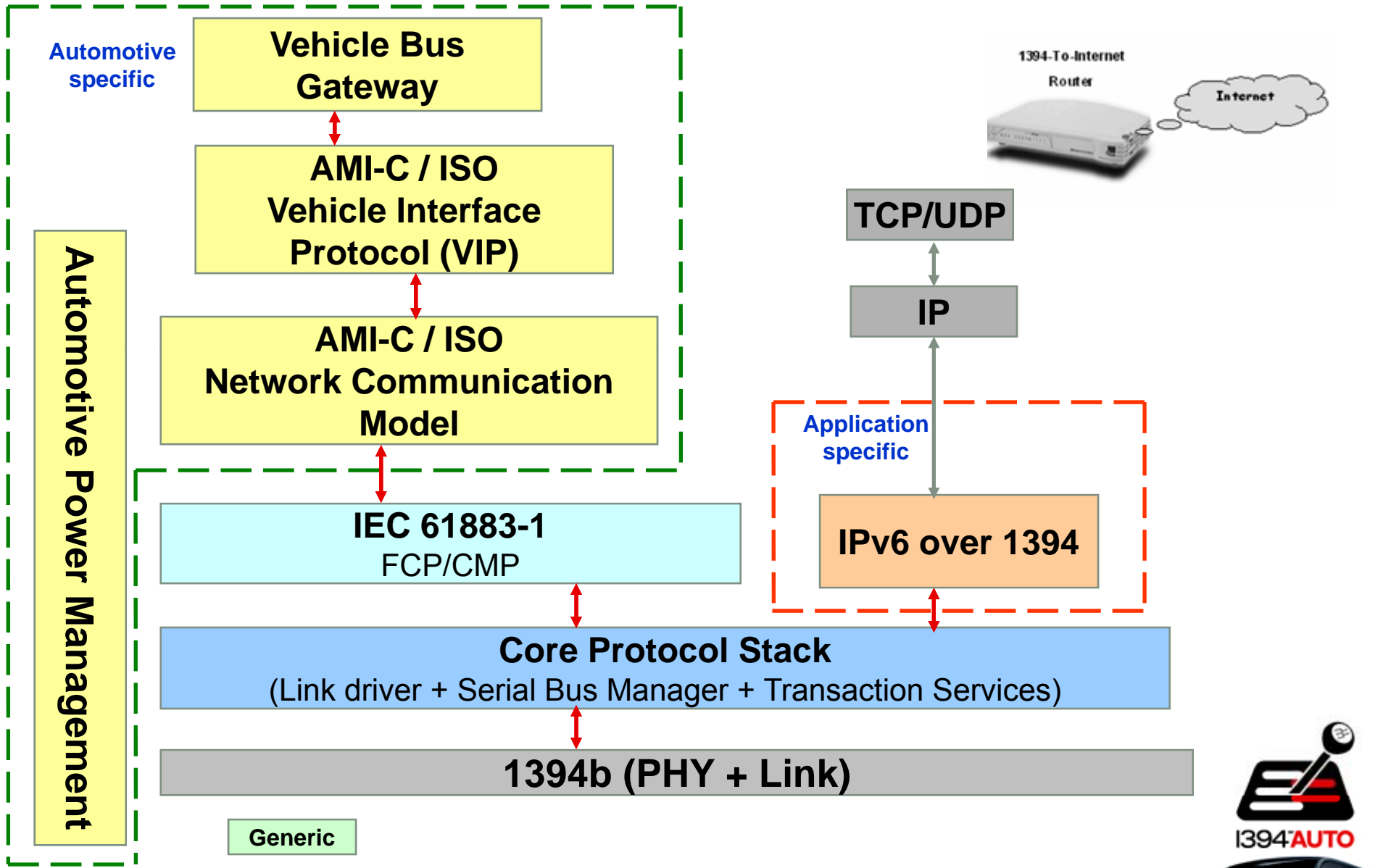


⊙ Use Cases

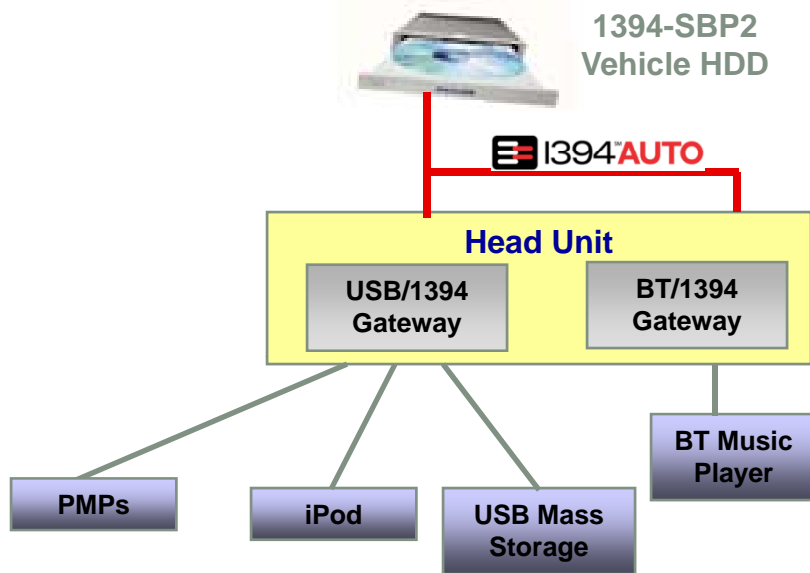
- In-vehicle Internet Connectivity
- Transmission of Internet datagrams over I394 AUTO



Use Case 4- In-vehicle Internet connectivity



Use Case 5 - Portable CE Device Connectivity

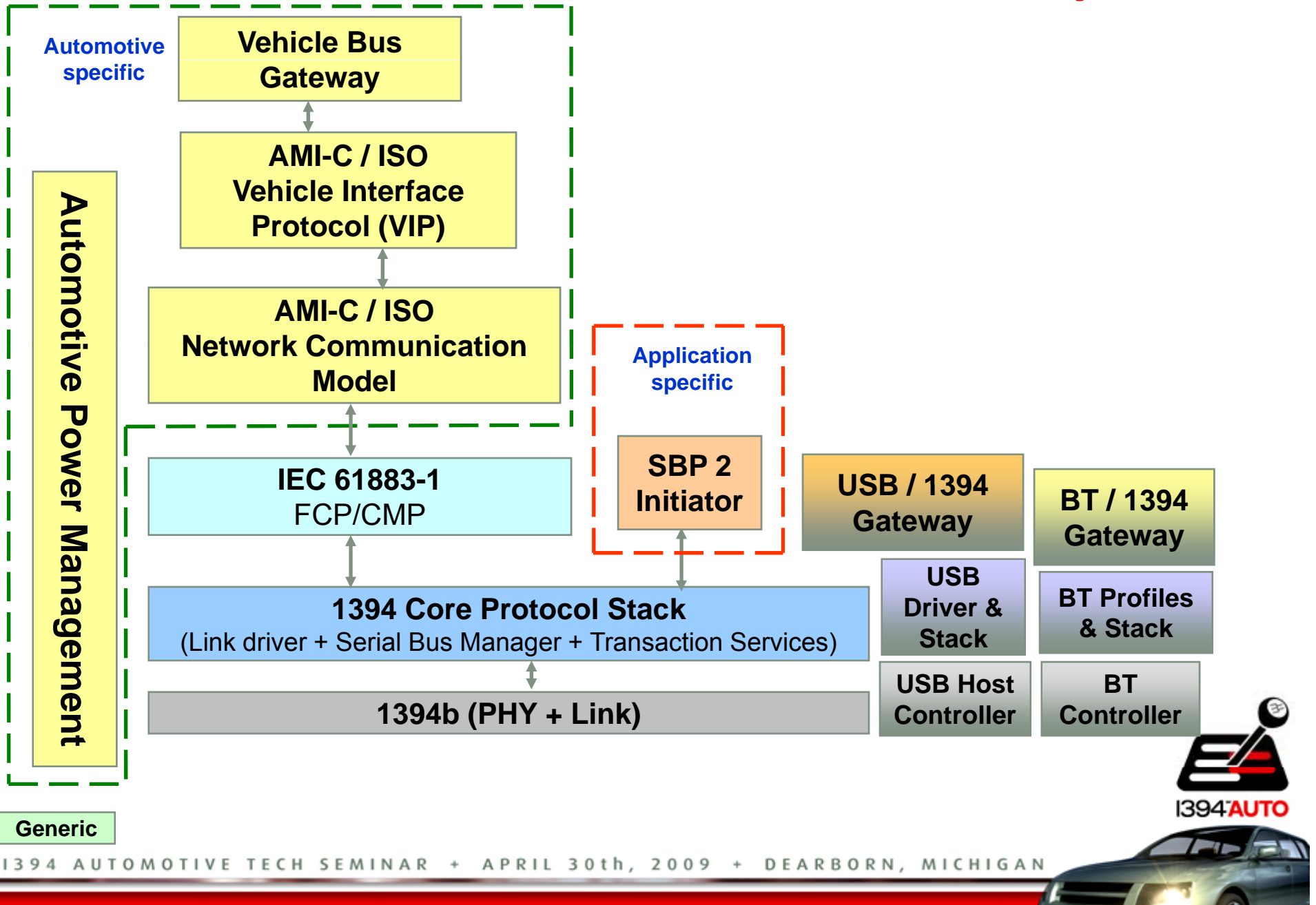


Use Cases

- Transfer of Media content (unprotected) from external CE devices, such as
 - USB Mass Storage Device
 - Portable Media Players
 - iPods
 - Bluetooth Audio streaming using A2DP/AVRCP to Vehicle HDD storage



Use Case 5 - Portable CE Device Connectivity



① Enabling 1394 Automotive Ecosystem

- By Wipro's 1394 Automotive SW stack



Enabling I394SM AUTO Software Eco-system

A/V Streaming + IIDC Camera
Control
Automotive OEM

Integration of A/V & Media
Player with Content Protection
American OEM

SBP2 based in-Vehicle
Navigation
Automotive Tier 1

Automotive Reference Platform
Microsoft Auto

Navigation system for
Head Unit
European OEM

Vehicular Security System
Based on 1394 IIDC Camera

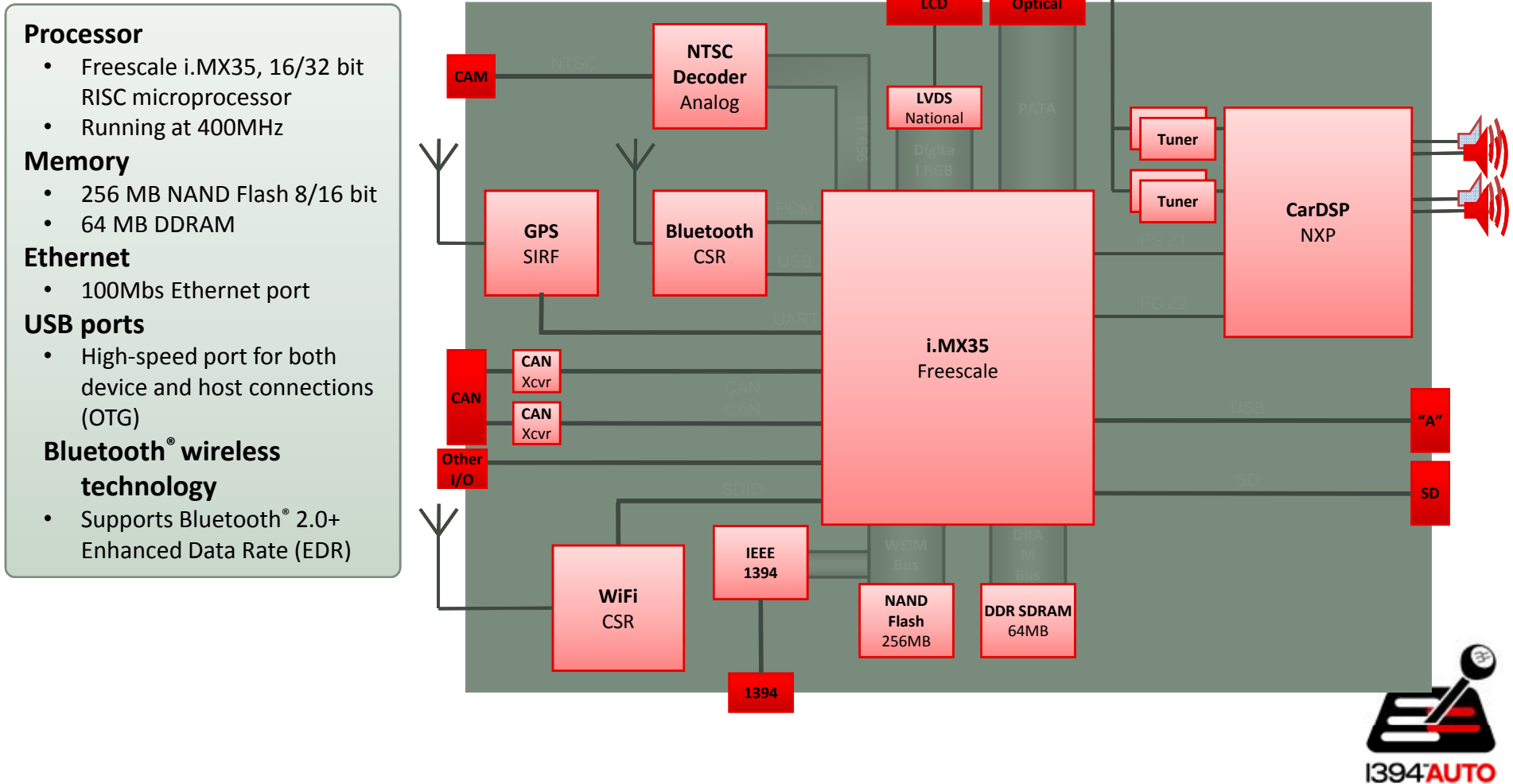


🎯 Microsoft Auto Platform



Microsoft Development Platform – F2

- The Microsoft Auto 4.0 Development Platform “F2” is a Freescale i.MX35 based complete hardware development platform



Current Microsoft Auto Platform

- **Built upon Windows Embedded CE 6.0**
 - Robust core platform
 - Rich feature set
 - Everything in CE can be used
- **Rich Media Player support**
 - Broad Device support
 - Media indexing to enable rich voice control
 - Extensible architecture for supporting new types of sources and new types of media formats
- **Hands free phone support**
 - Compatible with hundreds of phones
 - Extensive call control/management support
 - Phonebook sync with PBAP, SyncML, GSM AT and OBEX
- **Always updatable**
 - ImageFS for incremental updates
 - User initiated updates
 - Compatible with OTA updates
 - Regular device compatibility updates for partners
- **Rich System Services**
 - Connection Management
 - Audio management
 - Software AEC/NR
 - Speech Service
- **Development Hardware Platforms**
 - Texas Instruments Jacinto EVM
 - Renesas SDK 7785
 - Microsoft Auto development hardware using Freescale i.MX31



New for Microsoft Auto 4.0

- Microsoft Auto 4.0 extends the Microsoft Auto Platform with the following functionality:

- **Broadcast Radio**

- AM/FM, RDS, TMC
- HD Radio
- Extensible for DAB, DMB, DRM, Satellite, etc

- **CD, Optical Disk support**

- Rich media control of MP3 CD's and DVD's
- CD Ripping to local storage
- Interface for plugging in a metadata database

- **Bluetooth Networking**

- **IEEE 1394 support**

- **New Development Hardware Platforms**

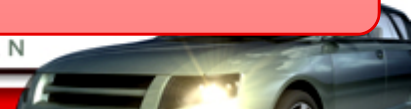
- Intel iA
- Freescale i.MX35

- **Media Player support**

- Album Art support across multiple player types
- Tag to purchase support for iPod's
- Video browsing on iPod/iPhones
- Improved indexing and podcast support

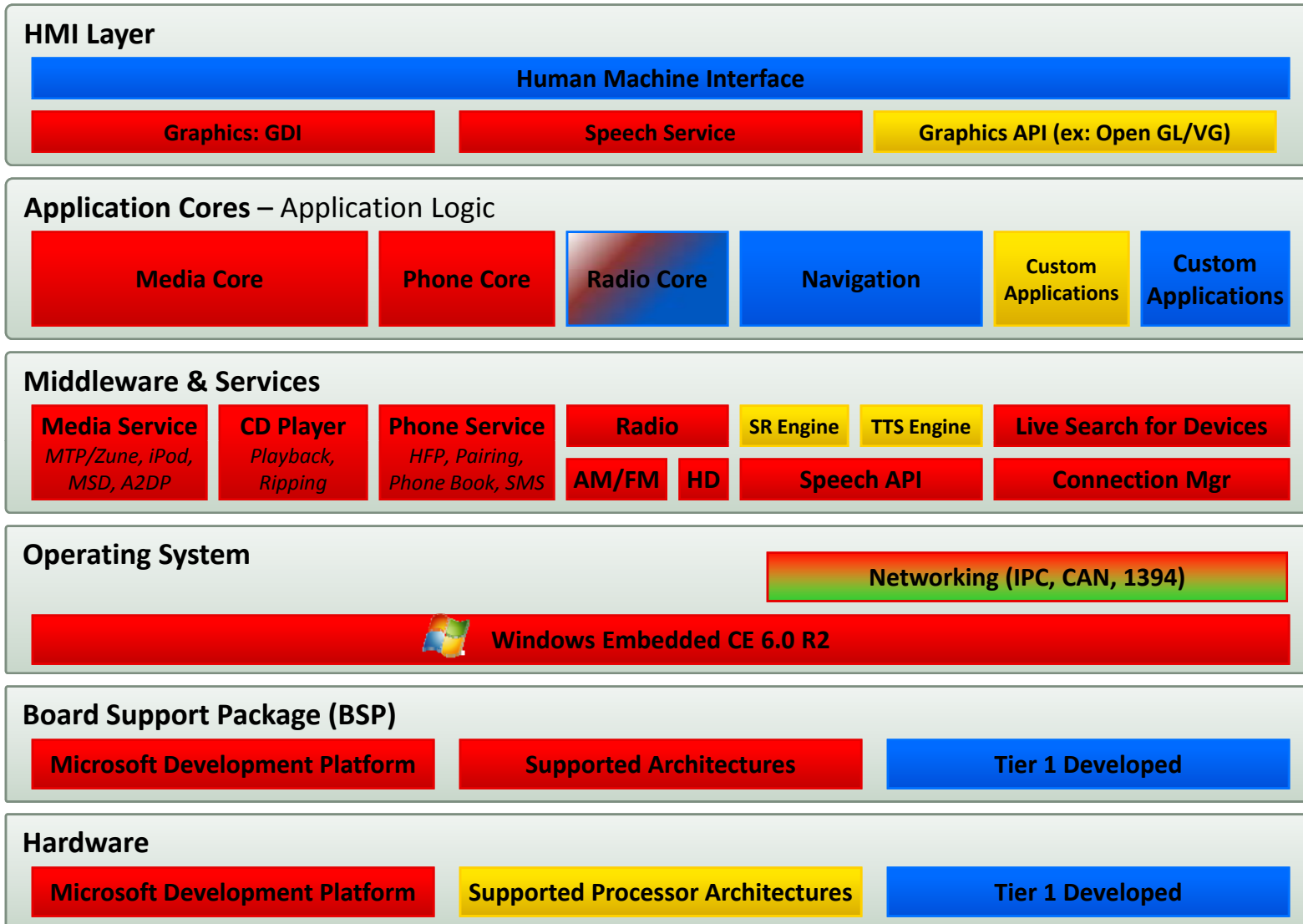
- **Updated Services Support**

- Local Search
- Weather
- Gas Prices (currently N.A. only)
- Movie Times (currently N.A. only)



Microsoft Auto 4.0 Platform Overview

System Integration



■ Microsoft
 ■ Tier 1
 ■ 3rd Party


Development Tools
Visual Studio



1394:AUTO



System and Networking

- ①  I394SMAUTO support for Audio, TCP/IP
 - DTCP support available from Wipro
- ① Primary use case:
 - In-car network, streaming video and music from the headunit to another display in the vehicle
 - E.g. Rear-seat entertainment



1394 Automotive software stack for Microsoft Auto Platform

Client : Microsoft Corporation

Platform Details (Microsoft Auto)

- Freescale's i.MX31 processor
- Fujitsu's MB88388 1394 Controller
- WinCE 6.0 Operating System



Requirement	Wipro's solution	Business benefits
<ol style="list-style-type: none">1. Licensing and porting of following Software IPs: IEEE 1394 Driver & Serial Bus Management, IDB-1394 Power Management, AV/C General Command Set, IEC 61883-1 FCP/CMP, 5C-DTCP, SBP2 Initiator, IPv4 over 13942. Configuration software development for using IEC61883-6, IEC61883-8 and DTCP encryption functions supported by the hardware.	<ol style="list-style-type: none">1. Customization of IEEE-1394 Software to fulfil client's architectural requirement as well as porting to Windows CE 6.0.2. Hardware independence through HW Abstraction Layer (HAL)3. Used TUX test automation tool available with WinCE for automating the testing	<ol style="list-style-type: none">1. Wipro's ready and easy to use solution provided time to market advantage to the customer.2. Future enhancement and up-gradation benefits due to modular design.

We have chosen Wipro-NewLogic as they have the leading industry knowledge in the 1394 domain with proven software stacks",

- Greg Baribault, Director, Automotive Business Unit



🎯 Case examples



Customization of SBP2 Mass Storage for Map Update in an in-vehicle Navigation System

Customization of IEEE-1394 and SBP2 Initiator IPs for Map Update Feature on a T-Kernel based Navigation Systems

Client profile

A leading Tier-1 Car Navigation System supplier in the world with advanced technologies

HDDナビゲーション内蔵HDD/DVD/ワンセグ 7.0AVシステム
「AVN7406HD」



The challenge

Integration of IP initiator and overall application design to achieve High speed data transfer for quick Map update

Wipro Solution

- ❑ **Customization of IEEE-1394 Software Stack:**
Successfully customized the software stack without affecting data transfer speed
- ❑ **Static Analysis:**
Code reviews, MISRA Compliance.
- ❑ **Testing:**
Tested on Client's T-Kernel based Navigation System platform having Dragon chip. Testing File transfers (Navigation data) from 1394 HDD (SBP2 Target) connected over 1394 bus using SBP2 Initiator software customized for Client's SW framework.

Business benefits

- ❑ Reusability of software in different variants.



Development of Vehicle Security System based on 1394 IIDC cameras

Client profile

A leading semiconductor company in Japan.

The challenge

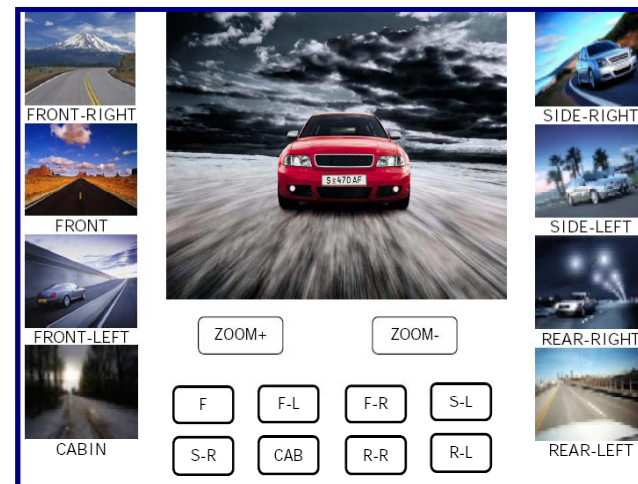
- Feasibility study of displaying real time images from multiple IIDC cameras over 1394 bus.
- Adapting and identifying changes required in a 3rd party software to model the concept.
- Demonstrating (to the client) the feasibility of the concept in PC based environment.

Business benefits

- Development of concept to prototype for a 1394 based vehicle security system.

Wipro solution

- Realization of concept to a PC based prototype.
- Selection of 1394 based IIDC cameras
- Controller development for IIDC device.
- Development of application software including user interface, Driver interface, IIDC controller.



Integration of A/V and Media Player devices in a IEEE1394-based in-vehicle Network

The task

- To formulate specifications for communications over 1394 network between various A/V Modules, display modules & Media gateway
- Transport of audio & video data from source to sink(s)
- Transfer of audio and video metadata (e.g. title, artist, album, track, chapter, etc.) from sources to sinks
- Command and control of audio/video sources from sink (s) (e.g., play, pause, stop, etc.)
- File transfer via asynchronous streams
- Transport of Internet Protocol datagram to enable internet browsing

The solution

- Command and Control of A/V sources based on AV/C Specifications
- Extended to support multiple display modules.
- Definition of Configuration ROM for each nodes in the 1394 network
- Approach for Device & Service Discovery in the network
- Approach for Audio and Video Streaming on the 1394 Network
- Framework based architecture in the target subunits to access various A/V sources
- Support for DTCP for Content Protection
- Support for SBP-2 and IP over 1394 Protocols
- Approach for Power Management & robust handling of bus reset
- Comprehensive Specification & High Level Design for the System





THANK YOU

Satish Premanathan
Satish.premanathan@wipro.com
Semi.ip@wipro.com

