

## Allion Test Devices Make Reliable In-Car Connectivity

Modern cars' network architecture supports not only the basic functions of vehicles such as engine control between sensors but also navigation, TV system, and other communication components. The most representative vehicle bus standards for this case are the Controller Area network (CAN), Local Internet Network (LIN), and FlexRay, the latter being designed to be much faster and more reliable than CAN.

### In-Car Solutions

CAN is a leading serial bus designed for in-car networks and it adopts twisted wire pairs. It is a reliable solution in noisy and electromagnetically interfered environments. CAN allows bus implementations such as Low Speed CAN for window and seat operations and High-Speed CAN for engine management and brake control. Each CAN message can transmit from 0 to 8b of information. It is also possible to transmit longer data information by using segmentation. As shown in Table 1, the maximum transmission rate of the CAN protocol is 1Mbps at 40m. Using CAN technology requires a CAN protocol license that is developed and patented by Robert Bosch GmbH. It is important to mention that CAN is not only used in the automobile industry but also in aerospace systems. It is said that more than 2 billion CAN nodes have been sold since the CAN protocol development. CAN is an ISO international standard.

LIN is an inexpensive low-speed serial bus for in-car connection and communication between intelligent sensors and actuators. It requires only a single wire for the physical implementation. It was developed by the LIN consortium with BMW, DaimlerChrysler AG, Audi, Volvo, Motorola, Volkswagen, and Volcano.

FlexRay is a high-speed and reliable system for in-vehicle network. It was developed through the leadership of BMW and DaimlerChrysler, particularly for the X-by-wire systems on automobiles. FlexRay supports data transmission with a bandwidth of up to 10Mbps.

In Japan, the industry association JasPar is working with other associations for the global penetration of FlexRay. Recently, the FlexRay Consortium decided to add a technical proposal made by JasPar in modification points of the

Protocol Specification V3.0 and the Physical Layer specification V3.0. FlexRay members can submit their devices for conformance test to designated test houses

### Growing MOST Backers

For entertainment and navigation systems, Media Oriented Systems Transport (MOST) is intended to provide standard interfaces for automotive multimedia applications (audio, video, navigation, and telecommunication systems) in vehicles, particularly in countries in Europe. In other words, MOST provides an optical solution for multimedia car equipment. Although Table 1 presents MOST with a maximum data rate of 50Mbps, the next-generation MOST is expected to rate 150Mbps.

At present, 16 international carmakers and more than 60 component suppliers back the MOST standard. Asian carmakers including Japan have implemented MOST technology in their latest models. MOST multimedia networks are featured in Toyota Crown Hybrid, Prius and in the hybrid version of the new Lexus RX SUV (Fig. 1). Also it is reported that up to 13 models manufactured by Asian carmakers such as Hyundai Genesis, Kia, Mohave, SsangYong Chairman, and the Toyota models Alphard, Crown, and Estima are MOST built-in. The MOST Cooperation introduced a MOST Compliance Test and makers can license their products after successfully completing the test at available authorized test houses.

It is also noteworthy to note that MOST aim to interconnect devices with navigation and audio function with external devices such as mobile phones or music players like i-Pod. This follows the increasing trend of using Universal Serial Bus (USB) connection and wireless technologies such as Bluetooth and Wi-Fi with in-car devices. Other technologies such as USB, 1394, High-Definition Multimedia Interface (HDMI), Ethernet and WiMAX have been tested by the automotive industry for further enhancement of automotive systems,



Toyota Prius



Lexus HS250h



Lexus IS

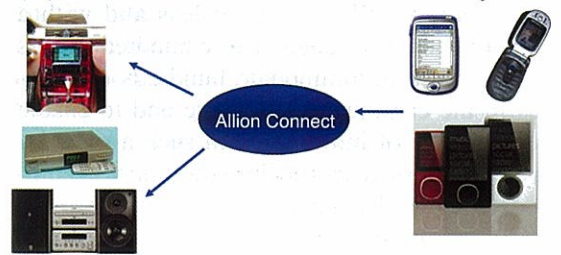


Hyundai EQUUS Sedan

Fig. 1: Asian cars with built-in MOST

### Allion Connect

Allion Connect is a certification program for interconnectivity and playback of secure content between devices and host systems.



• Car audio, Set-top box, Speaker...

• PDA, Cell phone, MP3 player

Fig. 2: How Allion Connect works?

### Reliable Testing

Aware of the growing importance of in-car entertainment and networking, the IT device testing company Allion Test Labs, Inc. has been working on in-car components connectivity test for devices such as navigation and audio systems and portable media players. For automotive connectivity, Allion is providing the Microsoft Zune Connectivity test for checking connectivity between the Zune media player and the in-car host device. Another certification program for automobile entertainment device connectivity is Allion Connect (Fig. 2). Allion Connect verifies the interconnectivity and playback of secure contents between portable devices and in-car host systems.

As modern cars network architecture becomes more complex, the need also grows for more reliable vehicle bus standards. The number of buses and protocols has been constantly growing along with the development of new car models. Though the CAN has been one of the most widely used automotive bus architecture, the speed of innovation will keep requiring update and improvement of present standards or the development of new standards. □

Table 1: Representative in-car communication formats

	LIN	CAN	FlexRay	MOST
Physical layer	Electrical (single wire)	Electrical (twisted wired pair)	Optical/Electrical	Optical
Application	Low level communication systems	Powertrain: Engine, Transmission, ABS	High Performance Powertrain, Safety X-by-wire, active suspension	Multimedia teletrics
Control	Single-master	Multi-master	Multi-master	Timing-master
Bus Access	Polling	CSMA/CA	TDMA/FTDMA	TDM/CSMA
Maximum data rate	20kbps	1Mbps	10Mbps	50Mbps

### About this Article

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