



MOST Adopted by Asian OEM

With a bit rate of 50 Mbps, MOST50 Technology not only offers twice the bit rate of the long-established MOST25 Technology, but also permits the use of unshielded copper cables for networking the MOST devices. The catalyst for Asian manufacturers planning to take MOST50 onboard was the option of retaining their existing wiring and assembly processes and the lack of requirement to switch to fiber optics. SMSC further compares these two multimedia network standards and conveys possible trends for the various markets.

1 Introduction

MOST® Technology (Media Oriented Systems Transport) is taking Asia's automotive market by storm. Its latest vehicle model is the Toyota Prius, which represents the third practical application of infotainment technology in hybrid vehicles. MOST multimedia networks already feature in the Toyota Crown Hybrid and in the hybrid version of the new Lexus RX SUV. In addition, the use of MOST Technology in the Toyota Prius shows that the multimedia network has also made inroads into the mass-produced models of the mid-range sector. Indeed, the new premium-sector Hyundai Equus also relies on MOST for data transmission within its all-round driver information system. The vehicles presented last year – the Hyundai Genesis, Kia Mohave, SsangYong Chairman and Toyota models the Alphard, Crown, Estima, Mark X ZiO and Vellfire – add up to a grand total of 11 models manufactured by Asian automakers with MOST built in. Whereas MOST25 Technology (based on optical data transmission using optical fibers and under development for many years in Europe) has established itself in the Korean market, the Japanese market in particular prefers the second generation of the MOST50 multimedia standard.

2 MOST50 – now in its second generation

MOST25 Technology has been used successfully by European automakers for many years. As a physical transmission medium, MOST25 uses an optical plastic fiber for transmitting both synchronous and asynchronous data as well as control information. The usable bandwidth is up to 25 Mbps, from which the name MOST25 is derived. The MOST Cooperation was established in 1998 with the aim of standardizing this technology. Today, it is made up of nearly 100 member companies and pursues the objective of propagating and continuously further developing MOST Technology. This in turn led to the creation of the second-generation MOST in 2006. The decisive factors here above all being the specifications „MOST Specification 2V5“ and „MOST Specification of Electrical Physical Layer 1V1“. This

second-generation MOST, or MOST50 for short, doubles the usable bandwidth to up to 50 Mbps and also allows use of unshielded twisted pair (UTP) cable by way of a physical transmission medium. The bit rate is doubled by using a more efficient coding. MOST50 uses a coding with twice the data density and, at the same transmission frequency, achieves twice the data rate compared with MOST25, the first generation. To comply with the stringent requirements of the automotive industry with regard to the electromagnetic properties of the electrical-physical transmission medium, numerous measures were implemented in the development of the second MOST generation. The radiation and resistance to jamming have been designed so that the technology can be used in the demanding environment of automotive applications. The measures extend to all levels of the ISO/OSI layer model. On the level of the physical transmission medium, for instance, cost-efficient transmitters for decoupling are used as a means of wiring up the network controller, **Figure 1**.

Once more, the complexity of the implemented optimizations shows that it is hardly possible to adapt standard 'consumer-type' technologies into the vehicle 'as is'. The recently often stressed take-over of consumer technology and the according cost advantages through the economy of scales has not been proven in any single case up to now. The environ-

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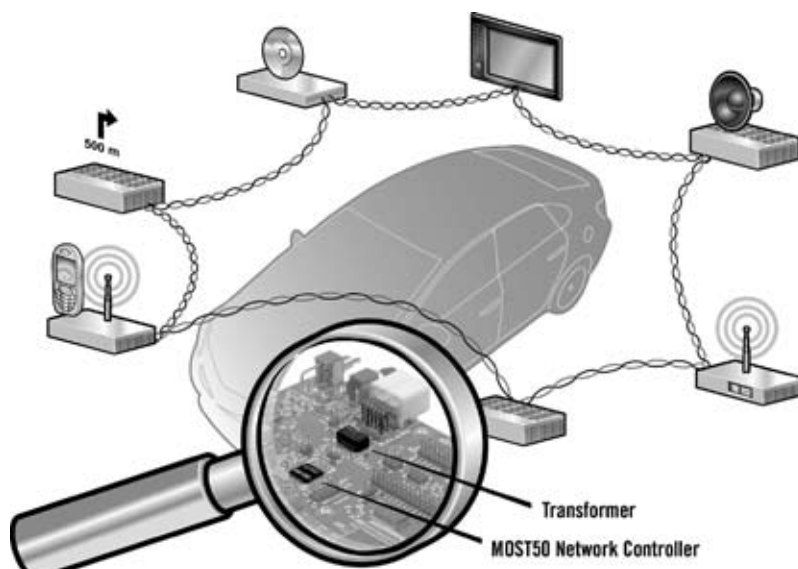


Figure 1: MOST50 network with unshielded twisted pairs and detail of a control unit

mental requirements such as temperature and electromagnetic compatibility (EMC) are just simple examples. Moreover, on the network and application layer, there are more things to consider in the automobile. When listening to music in the living room at home, people are listening to one single source at the time only: Radio, CD, DVD, or the Settop-Box, for example. In the car however it is necessary to mix several different source signals and listen to them at the same time. An example is when the traffic announcement from the radio interrupts the music from the CD and the navigation announcement comes on top – when at the same time a telephone call is being made. All these complex vehicle specific applications have been solved already with the first generation of MOST. Due to the clear structure and the separation of physical layer and application layer, MOST50 System take full advantage of these achievements and can even re-use the according application software without any changes. This is what you can call real synergy and re-use, a tremendous advantage in terms of time-to-market and maturity for MOST50.

3 Why is Asia first to use MOST50

With a bit rate of 50 Mbps, MOST50 Technology not only offers twice the bit rate of the long-established MOST25 Technology, but also permits the use of unshielded copper cables for networking the MOST control units. This enables automotive producers to develop an efficient and future-proof infotainment system also on the basis of copper cables that complies with the MOST specification. Despite the fact that plastic fibers have been used for many years successfully and without any problems in MOST25 systems, the option of using copper cables constitutes a significant factor for a number of automakers if existing wiring and assembly processes are to be retained. Against this backdrop, the desired use by production of wiring harness test points between control unit groups must also be considered based on the use of copper cables for existing processes.

The catalyst for Asian manufacturers planning to take onboard MOST50 was the option of retaining their existing wiring and assembly processes and the lack of requirement to switch to fiber op-

tics. Japanese philosophy declares that only one technology may be changed at a time. As such, MOST50 fits in ideally with this philosophy, since the transition to MOST Technology can be realized while retaining the established wiring and assembly processes.

This is equally important for countries with less high-tech oriented dealer and garage infrastructure. While handling optical fibers is part of the daily work for the garage staff in Western Europe, the situation in many Asian countries is quite different. On the contrary handling copper cables is well-known for many many years.

And, beside the Asian market there is some interest in the North-American Market too, in spite of the downturn. So it is well possible that one more time technology innovation is taking its way to America via some detours: From Europe, via Asia ...

4 MOST50 is fit for the future

Even now, the MOST50 specifications already satisfy future requirements on the infotainment system deployed in vehicles. For example, it is possible to link up DVD players, satellite receivers, digital audio/video players, digital storage devices, telematics systems and even rear-seat entertainment systems via plastic optical fibers or unshielded twisted pairs.

A demanding application is the transmission and playback of multi-channel audio streams for surround sound, **Figure 2**, where up to eight discrete PCM audio channels, each at 24-bit resolution, transmit at zero potential from the multimedia drive to the amplifier via MOST50. This permits outstanding audio quality with optimum sound distribution inside the vehicle, ensuring that each vehicle occupant enjoys the same audio quality. To ensure that the digital audio signals cannot be intercepted without permission, MOST50 supports encryption according to the DTCP method (Digital Transmission Content Protection), and thus complies to the licensing requirements of the music- and movie industry. The DTLA (Digital Transmission Licensing Authority) has already authorized DTCP for digital audio and video transmission via MOST.

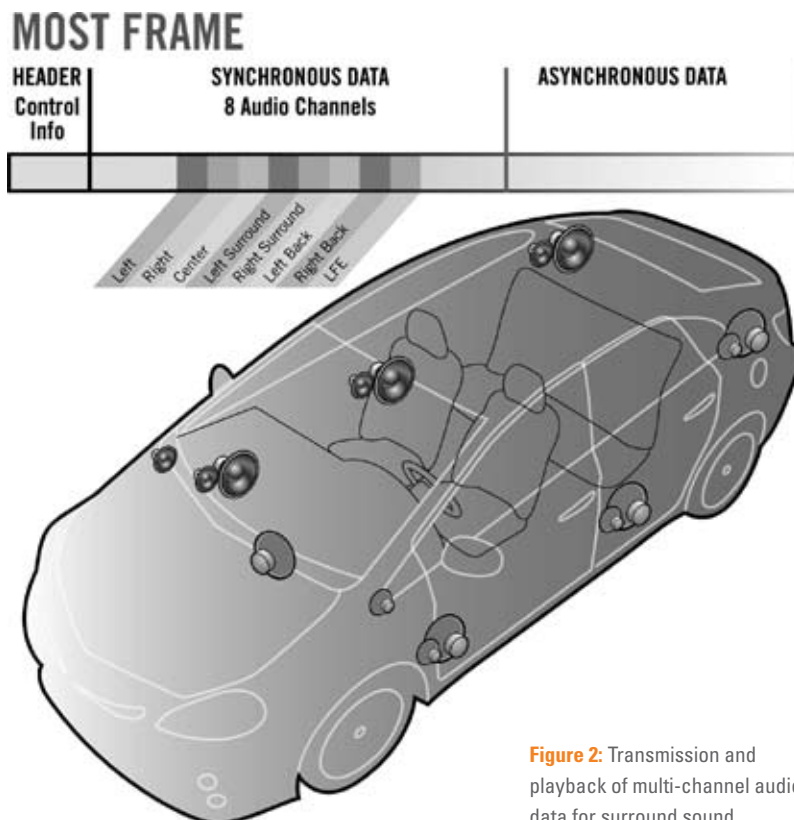


Figure 2: Transmission and playback of multi-channel audio data for surround sound



Figure 3: Rear-seat entertainment system for video and audio playback

To put video quality on a par with audio quality, MOST50 is capable of transmitting video signals digitally. The digital video sources, such as a DVD video drive or a DVB T tuner, supply their video information in compressed form. These digital video signals can be transmitted with the same quality via the MOST50 network as they are supplied from the video sources. All the devices within the MOST50 network have access to all the video signals transmitted within the MOST50 network, and can be switched back and forth between these at will. The network itself

acts as a distributed video switch, removing the need for external video switches, such as those required by other video solutions. In addition, the lip synchronization between video and audio is a no brainer when using MOST50, since the delay between image and sound is constant on account of the synchronicity of the MOST network. As a result, it is also possible to integrate rear-seat entertainment systems with multiple displays easily and inexpensively, **Figure 3**, since no special precautions have to be taken as regards the synchronization of the vari-

ous displays. It is also possible to transmit high-resolution video signals in the same way via MOST50. MOST50 is a future-proof multimedia network that will satisfy requirements well into the future.

Along with the Toyota Prius and the Toyota Crown Hybrid, the Lexus RX SUV is one of three hybrid vehicles with MOST built in. Since Toyota markets this Lexus model worldwide, MOST50 has crossed the threshold of the Japanese domestic market with Toyota's export models marking the start of second MOST generation's advance around the globe.

The new Toyota Prius is the first Japanese mid-range model to feature MOST that will be mass-produced and sold worldwide. For the reasons above, MOST50 will also be used in this vehicle. Its use in the Toyota Prius marks a further step for MOST Technology along the path toward becoming the global de-facto standard for multimedia networks with high transmission speeds in automobiles.

The Hyundai Equus is the most recent vehicle in the Hyundai model range to feature a fully equipped driver information and entertainment system. All data and information are transmitted via the MOST network. Here, Hyundai has chosen MOST25 and plastic fibers. Optional equipment can be integrated into the system relatively easily. The driver operates the all-round infotainment system from one central control unit. ■