

# 3 Gbit/s link for displays and cameras

*In summer 2010, Inova Semiconductors presented the 3 Gbit/s link APIX2. For a couple of weeks, customers have been provided with samples and Inova is already presenting several APIX2 applications at electronica.*

ROLAND NEUMANN\*

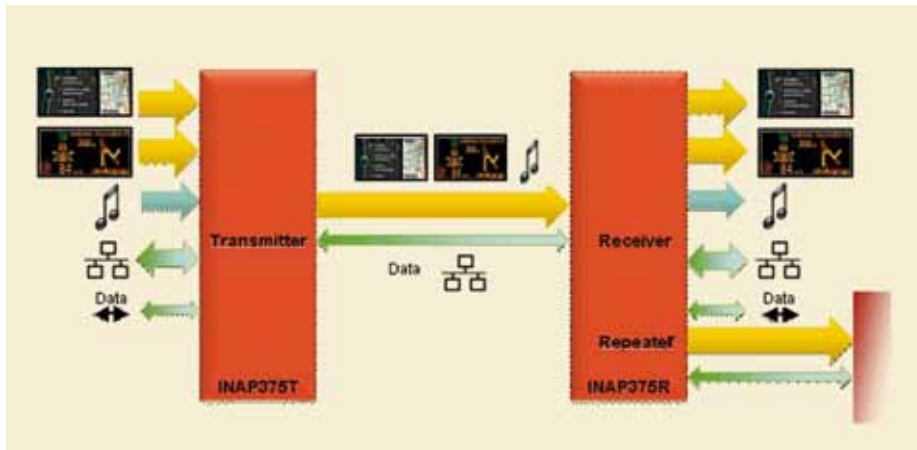


Figure 1: The APIX2 link can simultaneously transmit digital video and audio channels as well as Ethernet

With the trend towards ever greater, higher-resolution display formats of up to 12" and the new generation of megapixel image sensors with a high contrast range, the limits of display link with 1 Gbit/s have been reached. New system architectures for display and infotainment applications in cars require a much higher data rate though.

The display of certain information on several displays, the dynamic changing of display contents depending on drive and danger situation and the simultaneous transmission of control and steering data require a new gigabit link generation, which must be able to transmit different data formats simultaneously yet safely and reliably via a single cable/connector system.

## Only one cable for image, sound and Ethernet

With the development of APIX2, Inova Semiconductors has responded to all these requirements and more: the second APIX generation has become a true data highway that can transmit various data formats simultaneously on a single copper cable.

As with the APIX1, the well-proven clock system with packet-oriented data transmission is used; the data rate was increased to

a high 3 Gbit/s for the APIX2 though. The integrated communication channels, which additionally transmit data in both directions, now also have triple bandwidth at 187 Mbit/s.

In order to continue using low-cost 4-line STP cables and connectors that were established in cars for 1 Gbit/s display links from Inova and other providers, the APIX2 uses actively controllable levels for signal conditioning in the Tx- and the Rx-device.

They efficiently compensate the extreme signal distortions that are incurred by differing group delay times in the cable with the high data rate of 3 Gbit/s. This allows reliable and stable data transmission even for cable lengths of more than 10 meters.

This newly developed 3 Gbit/s physical layer together with other innovations now enables completely new system architectures. APIX2 is a true car "data highway".

## Simultaneous real time transmission with no compression

This means that two video contents with completely different formats and resolutions can be transmitted simultaneously – uncompressed and in real time – for instance for the instrument combination- and the central information display. It is also possible to select the content to be shown on a display from the APIX receiver chip: if one display fails, the other one can immediately "jump in" to display important information to the driver.

A repeater firmly installed in the receiver chip allows also forwarding this data stream with the two image contents to another receiver device, for instance in the head-up display. This integrated repeater function reduces size, weight and costs because one control unit with a powerful graphics processor can now operate several displays via a single cable.

Up to eight digital audio channels can be transmitted in the serial data stream in ad-



Figure 2: Fujitsu is presenting the graphic interaction between driver and vehicle as a combination of SoC HW, graphics SW and HMI tool chain



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dition to the image data. APIX2 is equipped with a standardized I<sup>2</sup>S interface for that.

Thanks to the additional communication channels APIX2 has become a true data highway and a backbone for the information network in the car. Fully independent from image and audio signals, APIX2 can also transmit a range of bus protocols in compliance with standards and without limitations (for instance, to the latency period). In addition to SPI or GPIO, this data interface can also be configured as a real MII (Media Independent Interface) which makes possible a direct connection of an Ethernet MAC. The APIX2 link also has a special I<sup>2</sup>C interface to control the camera sensors (Figure 1).

### First systems with APIX2 to be seen at electronica 2010

In a concept car of the Manching based Ergoneers company, Fujitsu Semiconductor is presenting its new vision for graphical interaction between driver and vehicle. (Figure 2)

The graphic is demonstrated on a new 12.3" Hitachi Automotive IPS Pro display with a resolution of 1440x540 pixel (first exposed).

The DSP Weuffen system specialist from Amtzell is also showing the next generation of surround vision systems in this concept car. Four compact HD cameras with the latest Omnivision Megapixel HDR sensor OV10630 are connected to a control unit via APIX2 link and the pixel data is transmitted uncompressed and in real time.

The central unit constructs then a virtual top view surround image out of these four individual images, the result is a detailed and high-contrast image (Figure 3).

### 2-chip camera module with sensor and APIX2 transmitter

Supertech Optoelectronics, a manufacturer from Taiwan specializing in automotive cameras, is presenting the functional prototype of a fully digital 2-chip camera module with an OV10630 sensor and contemporary APIX2 transmitter at the "electronica".

The Duisburg-based company Helion Vision, which also specializes in the development of camera systems for cars, is presenting a new high dynamic range camera system with APIX link that uses the image sensor of another major US manufacturer, Aptima.

And the Westphalia-based cable manufacturer Ernst&Engbring is announcing its entry into the cable sector for displays and camera applications in the automotive segment at the "electronica" and presents their first



Figure 3: DSP Weuffen is showing the next generation of surround vision systems at the electronica 2010

products that are already specified for 3 Gbit/s. Inova (electronica, hall A6, booth 313) itself is presenting a modular demo kit at the trade show, which supports developers in the evaluation of the APIX2 link – as with the ADK for APIX1 – in addition to numerous other solutions involving APIX.

### Extremely compact APIX2 transmitter for megapixel sensors

The popularity of APIX2 as camera link as well – Inova also cooperates closely with the leading sensor manufacturers Omnivision and Aptima – has already lead to intensive research for the next product of the APIX family. Appearance of an extremely compact APIX2 transmitter device, ideally adjusted to contemporary megapixel sensors will result in super-compact and very powerful 2-chip camera modules.

This new product will be available as early as mid-2011. The first semiconductor manufacturers are already integrating APIX2 in graphics processors with several APIX inputs and outputs. Further announcements will follow shortly. //JW

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