

**Technical Article**

# Bringing 16-core Server Grade Support and 10GbE to COM Express

COM.0 Revision 3.0 Type 7



# COM Express Type 7

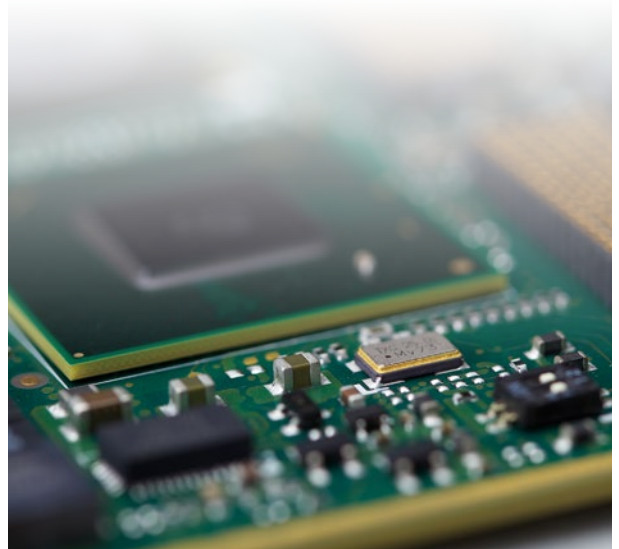
A new COM Express specification, developed by the PICMG COM Express subcommittee headed by ADLINK CTO Jeff Munch, is in a pre-release stage.

One of the upcoming major advancements is the COM Express Type 7 pinout supporting up to four 10GbE-KR interfaces, making it ideally suited for the new edge node servers required by IoT and Industry 4.0 applications.

By 2020, it is expected that data created and copied annually, much of it from IoT, cloud and big data applications, will increase to around 44 zettabytes. That's 44 trillion gigabytes. In order to minimize traffic between clients, central clouds and data centers, data should be processed as close as possible to its place of origin or inquiry location. IoT and Industry 4.0 applications need this decentralized capacity to process sensor and measurement data in real time. In particular, data-intensive video streaming applications need local virtualized systems with multiple cores and larger caches to achieve the required transcoding performance. This is not only relevant for video-on-demand in the telecom segment but also for medical and security applications. Another important application for edge servers is Deep Packet Inspection, which ensures data security and optimal Quality of Service.

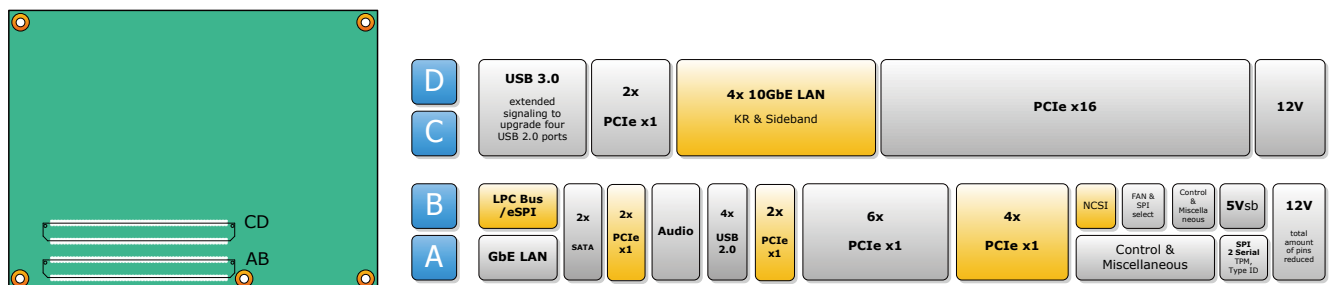
virtualization ARM designs are also interesting, such as the recently launched AMD Opteron A1100 ARM processor and various PowerPC platforms, such as the QorIQ family from NXP. Developers do not, however, need to ultimately decide which processor is ultimately the best platform. They can stay flexible using the new COM Express specification with Type 7 pinout.

The structure of the network is thus transformed to an infrastructure which uses high-performance edge node servers distributed over the whole network that perform their functions close to the end user, reducing latency and backbone traffic. A high bandwidth of 10GbE is essential for such appliances. Examples of system-on-chip solutions which provide this performance at a relatively low power consumption of 65 watts or less are the Intel® Xeon® processor D family (with up to 16 cores) and the Intel® Atom™ processor C family, both of which support



## COM Express COM.0 rev.3.0

The new Type 7 pinout removes all display interface support and replaces it with up to four 10GbE-KR ports and up to 8 additional PCIe lanes.



Note:

The COM Express Type 7 pinout is still under review at time of editing. Please refer to the ADLINK website for the updated specification.



## The new COM.0 Type 7

### Supports Server Grade Processors with up to 16-cores

ADLINK's first COM Express Type 7 product, the Express-BD7, is based on the Intel® Xeon® processor D, available in 2, 4, 8, 12 and 16-core versions for scalable computing performance. The Express-BD7 is suitable for space-constrained systems with increased density and reduced power consumption such as virtualization, edge computing or other numerical applications.

### Bringing 10GbE to COM Express

One of the most fundamental innovations of the COM Express Type 7 pinout is the support of up to four 10GbE interfaces, essential for the next generation of edge node appliances. On the module they are implemented as 10GbE-KR, i.e. as single backplane lanes according to IEEE 802.3, paragraph 49. The physical implementation of the 10GbE interfaces takes place on the carrier board itself. Developers can define the signal transmission as optical (SFP+), copper cable (T). This provides flexibility for new designs.

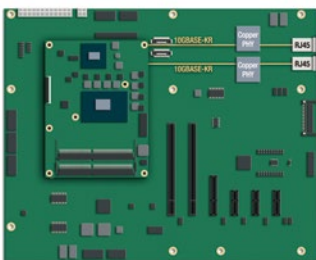
To a large degree, the Type 7 pinout follows that of Type 6. To create the capacity for up to four 10GbE interfaces, the signal lines of the Digital Display Interfaces (DDI) on the CD connector of the Type 6 pinout are used. Since most new edge node appliances do not require any video output, all graphics interfaces have been removed from Type 7.

The AB connector has also had pins freed up. This was done by removing the LVDS (edP) and VGA pin assignments. Further pins were freed up by only supporting 4 USB ports and two SATA ports. In place of these interfaces, up to 8 PCIe lanes were added. Additionally, an NC-SI port is specified to allow connection of an IPMI BMC on the carrier board.

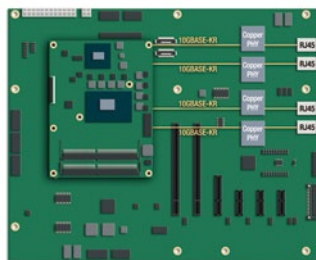
The official pinout and signal descriptions were pre-released to the public at the end of July 2016. The finalization of the specification will take until Q4 but no major changes are expected in the pinout itself. This means that customers can start design of their carrier board products at this time.

### 1U with up to 10 modules

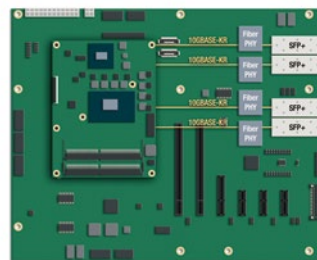
With COM Express Type 7, the benefits of the COM Express specification are made available to new high-bandwidth, data-intensive edge node server applications: Thanks to the core-module design concept and standardized pinout, system design becomes independent of processor technology. Systems can be upgraded with a simple module exchange. And thanks to its compact dimensions, COM Express modules enable a high packing density: 10 modules can be integrated in a 1U enclosure, providing a maximum combined data transfer rate of 0.4 terabits per second. The modular COM Express design makes this type of solution highly flexible and scalable, minimizes development costs and shortens time-to-market. OEMs also gain more design security and can use their designs for longer, thereby additionally increasing their return on investment.



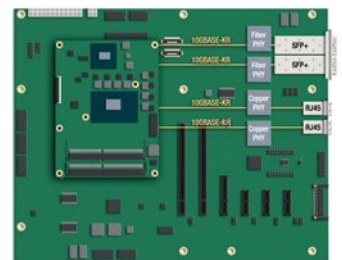
2x 10GBASE-KR through Copper PHY to 2x RJ45



4x 10GBASE-KR through Cooper PHY to 4x RJ45

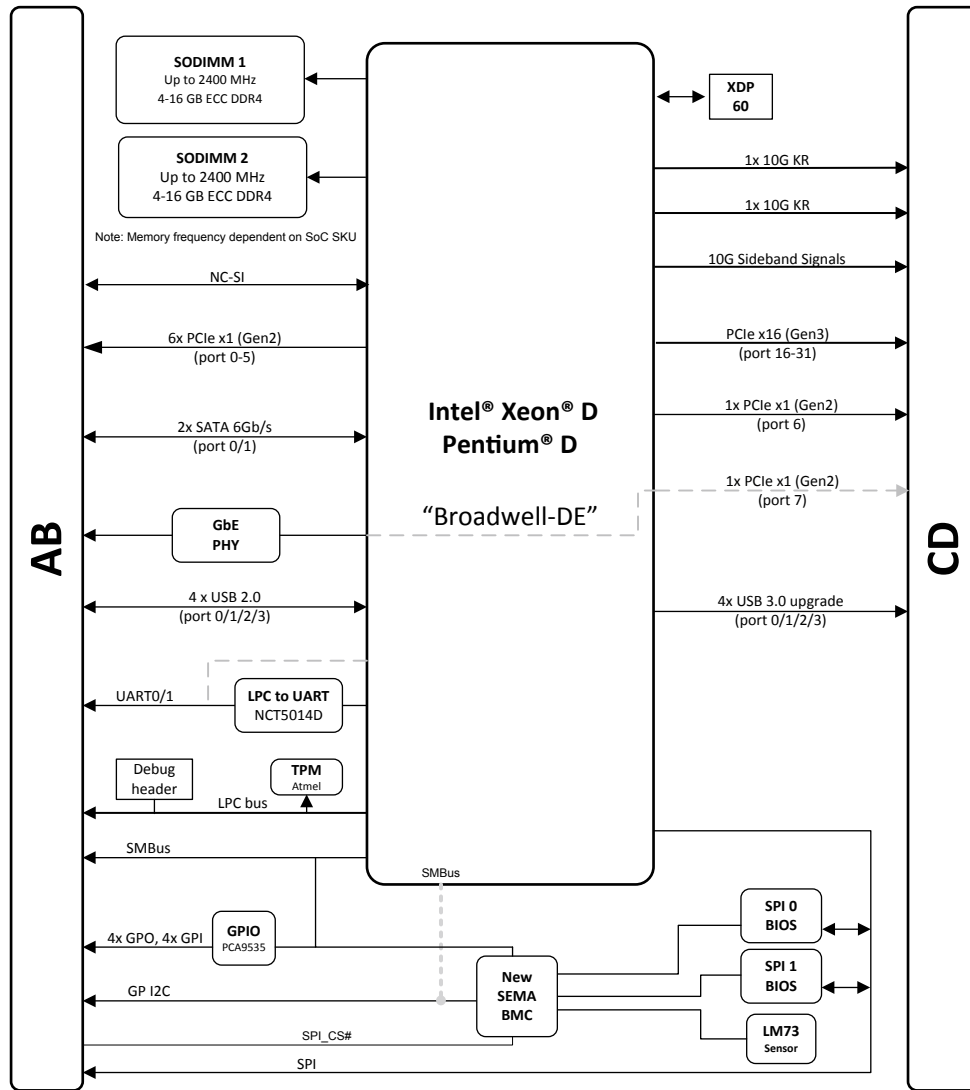


4x 10GBASE-KR through Fiber PHY to 4x SFP+



4x 10GBASE-KR though Fiber PHY/ Copper PHY to SFP+/RJ45

## ADLINK Express-BD7 COM Express Type 7 Module Block Diagram



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### Start Designing Today!

The above module is available in the form of a Type 7 Starter Kit that includes carrier, module, adapter LAN PHY card, BSP, Design documents such as Schematics and Layout examples as well as free carrier schematics review service.



### Express-BD7

#### COM Express Basic Size Type 7 Module with up to 16 cores Intel® Xeon D and SoC

- Up to 16 cores Intel® Xeon D SoC
- Up to 32GB dual channel DDR4 at 2400MHz ECC
- Two 10G Ethernet and NC-SI support
- Up to eight PCIe x1 (Gen2), one PCIe x16 (Gen3)
- GbE, two SATA 6 Gb/s, four USB 3.0/2.0
- Supports Smart Embedded Management Agent (SEMA®) functions
- Extreme Rugged operating temperature: -40°C to +85°C (build option)

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## About ADLINK

ADLINK Technology is enabling the Internet of Things (IoT) with innovative embedded computing solutions for edge devices, intelligent gateways and cloud services. ADLINK's products are application-ready for industrial automation, communications, medical, defense, transportation, and infotainment industries. Our product range includes motherboards, blades, chassis, modules, and systems based on industry standard form factors, as well as an extensive line of test & measurement products, smart touch computers, displays and handhelds that support the global transition to always connected systems. Many products are Extreme Rugged, supporting extended operating temperature ranges, and MIL-STD levels of shock and vibration.

ADLINK is a Premier Member of the Intel® Internet of Things Solutions Alliance and is active in several standards organizations, including the PCI Industrial Computer Manufacturers Group (PICMG), the PXI Systems Alliance (PXISA), and the Standardization Group for Embedded Technologies (SGET).

ADLINK is a global company with headquarters in Taiwan and manufacturing in Taiwan and China; R&D and integration in Taiwan, China, the US, and Germany; and an extensive network of worldwide sales and support offices. ADLINK is ISO-9001, ISO-14001, ISO-13485 and TL9000 certified and is publicly traded on the TAIEX Taiwan Stock Exchange (stock code: 6166).

For more information on ADLINK, please visit [www.adlinktech.com](http://www.adlinktech.com).

### **Author: Jeff Munch**

*Jeff Munch, CTO of ADLINK has been Chairman of most PICMG COM Express subcommittees since 2009. In this role he has headed the last five of seven COM Express initiatives and brought together companies such as Advantech, Congatec, Kontron, MSC/Avnet and Intel.*

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