Building Forward Together | ADLINK®

Technical Article

Bringing 16-core Server Grade Support and 10G 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 soon to be released. 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.

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 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 today which processor is ultimately the best platform. They can stay flexible using the new COM Express specification with Type 7 pinout.
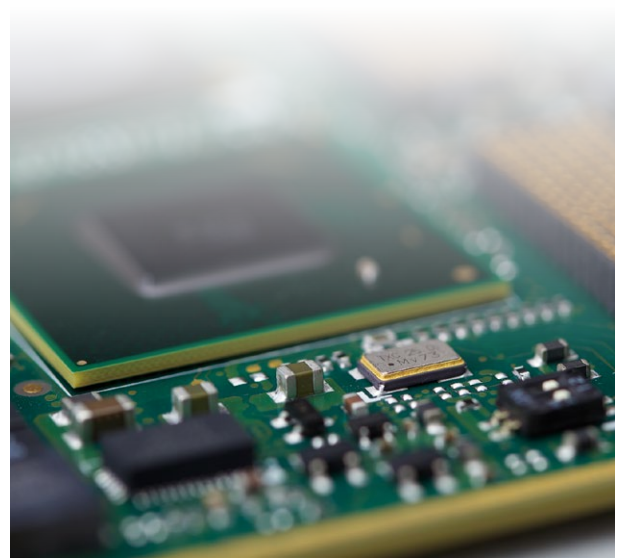
COM Express COM.0 rev.3.0
The new Type 7 pinout provides up to four 10GbE-KR ports for bandwidth-and data-intensive designs.
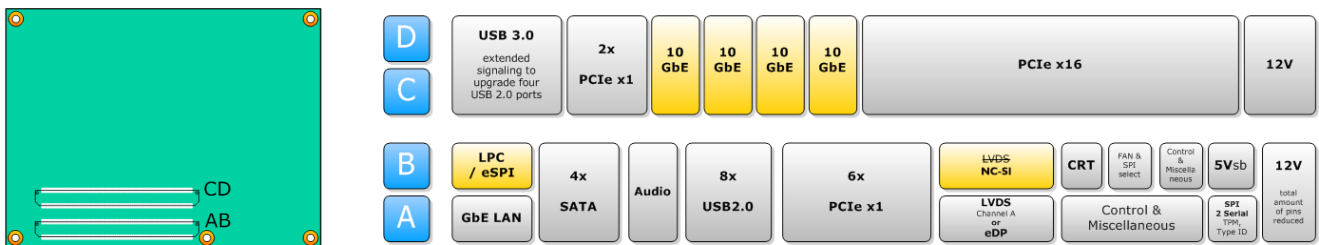
Note:
The COM Express Type 7 pinout is still under review at time of editing. Please refer to the ADLINK website for the updated specification.

The new COM.0 Type 7

Supports up to 16-core Server Grade Processors

ADLINK's first COM Express Type 7 product, the Express-BD7, is based on the Intel® Xeon® processor D, available in 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 high-resolution multi-screen outputs, multiple DDI interfaces are not needed for these applications. For local management and maintenance consoles, the eDP/LVDS interface is still available and located on the AB connector. If developers wish to retain DDI, a hybrid solution with 2x 10GbE and a DDI interface will be supported by the specification. Together with the eDP/LVDS interface on the AB connector, solutions that offer both high network and video performance are also possible.

No change is expected to the existing 1 GbE port on the Type 6 AB connector. However, there are discussions on expanding this port to 10GbE; including the physical definition, and PHY, for 10GBASE-T.

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.
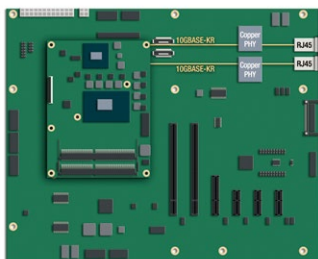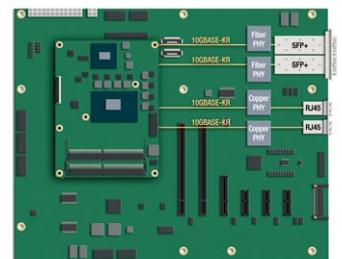

2x 10GBASE-KR through Copper PHY to 2x RJ45
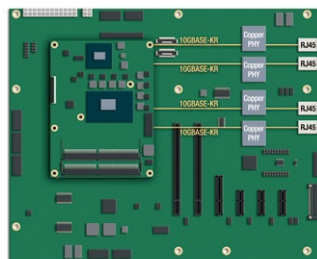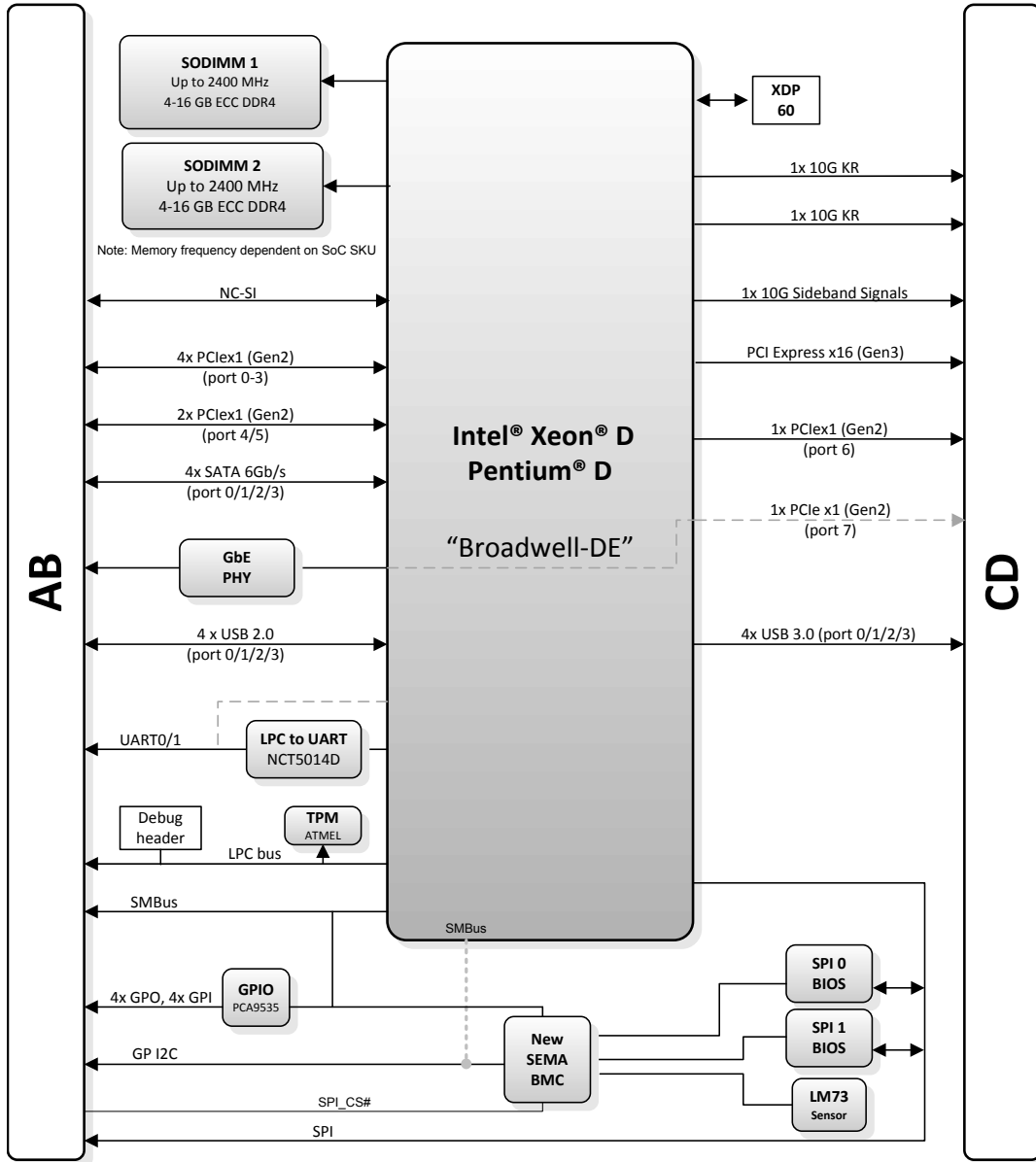

4x 10GBASE-KR through Cooper PHY to 4x RJ45
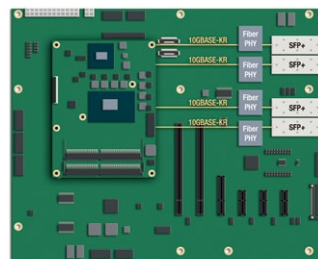
4x 10GBASE-KR through Fiber PHY to 4x SFP+

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

ADLINK COM Express Type 7 block diagram

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.

Further upgrades

The new specification, which was mainly drafted by the COM Express team at ADLINK headed by Henk van Bremen, is expected to become available at the end Q2 2016, with the Type 7 CD connector pin assignment expected to be released at the end of Q1 to allow vendors to begin working on new designs. The COM Express Rev. 3.0 specification will include both the new

Type 7 pinout as well as expected changes to existing pinout types to address minor issues and to migrate from the legacy LPC bus to the eSPI bus. The group is also trying to achieve greater unification on the AB connector between the existing Type 6 and Type 10 pinouts in order to simplify design considerations for manufacturers.

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.

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.

Contributors:

Henk van Bremen is Senior Director of ADLINK's Module Computing Product Segment and Alex Wang is Product Manager of ADLINK's Module Computing Product Segment. Messrs. van Bremen and Wang are two leaders of the initiative to define the COM Express Type 7 specification.

WORLDWIDE OFFICES

ADLINK Technology, Inc.

9F, No.166 Jian Yi Road, Zhonghe District
New Taipei City 235, Taiwan
新北市中和區建一路166號9樓
Tel: +886-2-8226-5877
Fax: +886-2-8226-5717
Email: service@adlinktech.com

Ampro ADLINK Technology, Inc.

5215 Hellyer Avenue, #110 San Jose, CA 95138, USA
Tel: +1-408-360-0200
Toll Free: +1-800-966-5200 (USA only)
Fax: +1-408-360-0222
Email: info@adlinktech.com

ADLINK Technology Singapore Pte. Ltd.

84 Genting Lane #07-02A, Cityneon Design Centre,
Singapore 349584
Tel: +65-6844-2261
Fax: +65-6844-2263
Email: singapore@adlinktech.com

ADLINK Technology Singapore Pte Ltd. (Indian Liaison Office)

#50-56, First Floor, Spearhead Towers
Margosa Main Road (between 16th/17th Cross)
Malleswaram, Bangalore - 560 055, India
Tel: +91-80-65605817, +91-80-42246107
Fax: +91-80-23464606
Email: india@adlinktech.com

ADLINK Technology Japan Corporation

〒101-0045 東京都千代田区神田鍛冶町3-7-4
神田374ビル4F
KANDA374 Bldg. 4F, 3-7-4 Kanda Kajicho,
Chiyoda-ku, Tokyo 101-0045, Japan
Tel: +81-3-4455-3722
Fax: +81-3-5209-6013
Email: japan@adlinktech.com

ADLINK Technology, Inc. (Korean Liaison Office)

경기도 성남시 분당구 수내로46번길4 경동빌딩 2층
(수내동 4-4번지) (우) 13595
2F, Kyungdong B/D, 4 Sunae-ro 46beon-gil, Bundang-gu,
Seongnam-si, Gyeonggi-do, Korea, 13595
Toll Free: +82-80-800-0585
Tel: +82-31-786-0585
Fax: +82-31-786-0583
Email: korea@adlinktech.com

PENTA ADLINK Technology GmbH

Ulrichsbergerstrasse 17
94469 Deggendorf, Germany
Tel: +49 (0) 991 290 94 – 10
Fax: +49 (0) 991 290 94 - 29
Email: emea@adlinktech.com

ADLINK Technology (China) Co., Ltd.

上海市浦东新区张江高科技园区芳春路300号 (201203)
300 Fang Chun Rd., Zhangjiang Hi-Tech Park
Pudong New Area, Shanghai, 201203 China
Tel: +86-21-5132-8988
Fax: +86-21-5192-3588
Email: market@adlinktech.com

ADLINK Technology Beijing

北京市海淀区上地东路1号盈创动力大厦E座801室(100085)
Rm. 801, Power Creative E, No. 1 Shang Di East Rd.
Beijing, 100085 China
Tel: +86-10-5885-8666
Fax: +86-10-5885-8626
Email: market@adlinktech.com

ADLINK Technology Shenzhen

深圳市南山区科技园南区高新南七道数字技术园
A1栋2楼C区 (518057)
2F, C Block, Bldg. A1, Cyber-Tech Zone, Gao Xin Ave. Sec. 7
High-Tech Industrial Park S., Shenzhen, 518054 China
Tel: +86-755-2643-4858
Fax: +86-755-2664-6353
Email: market@adlinktech.com

LiPPERT ADLINK Technology GmbH

Hans-Thoma-Strasse 11, D-68163 Mannheim, Germany
Tel: +49 621 43214-0
Fax: +49 621 43214-30
Email: emea@adlinktech.com

ADLINK Technology, Inc. (French Liaison Office)

6 allée de Londres, Immeuble Ceylan 91940 Les Ulis, France
Tel: +33 (0) 1 60 12 35 66
Fax: +33 (0) 1 60 12 35 66
Email: france@adlinktech.com

ADLINK Technology, Inc. (Israel Liaison Office)

27 Maskit St., Corex Building PO Box 12777
Herzliya 4673300, Israel
Tel: +972-54-632-5251
Fax: +972-77-208-0230
Email: israel@adlinktech.com

ADLINK Technology, Inc. (UK Liaison Office)

Tel: +44 774 010 59 65
Email: UK@adlinktech.com