PUZZLE-IN003B

IEI Puzzle with Intel® Solution

UTM IDS

www.ieiworld.com

intel IoT Solutions Alliance

IEI PUZZLE Series Products

Aiming to The Future with Next Generation Network Appliance

Proprietary Network Appliance

A Proprietary network appliance is a specialized electronic device that plugs into a network that is optimized for one specialized network purpose like switching, routing, protecting in a network environment. Proprietary network appliances include as Router, Load Balance, Bandwidth Management, Gateway security, WAN Optimization, application delivery controller (ADC), Next Generation Firewall (NGFW), Unified Threat Management (UTM), and Intrusion detection system (IDS).

uCPE (Universal Customer Premise Equipment)

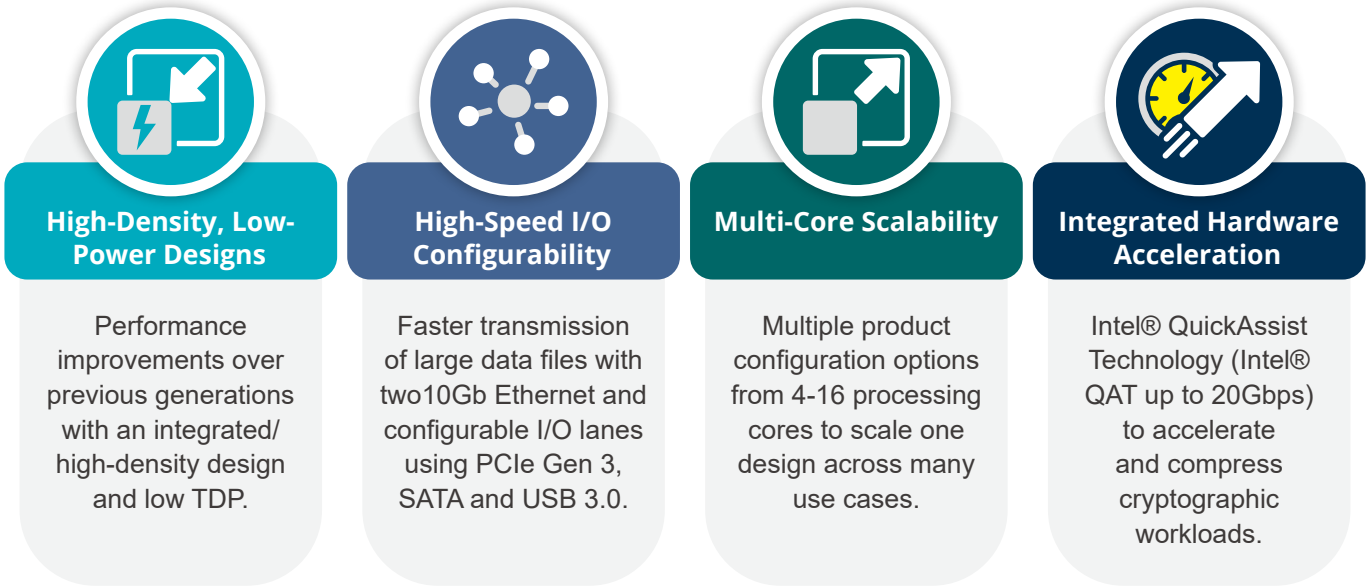
uCPE consists of virtual network functions (VNFs) running on a standard operating system hosted on an open server with NFV technology.

Now with NFV technology, we can create several virtual machines and install these VNFs in a x86 or ARM based uCPE. VNFs could include popular software services such as a virtual firewall, virtual load-balancing, or other software-defined wide area network (SD-WAN)service. Besiads with NFV Orchestration, uCPU could be an edge computing system or an AI inference computing system.

Low Power, High Density, High Speed IO and Integrated accelerator

The PUZZLE-IN003B is a desktop network device that easily places in space limited area, providing an ideal network solution. The PUZZLE-IN003B comes with Intel® Atom® Processor C3000 series (C3558/C3758) System On Chip (4 core to 16 core and up to 2.2Ghz) which supports up to 128GB Dual-channels DDR4 2400 MHz ECC (UDIMM, or RDIMM), two 10Gb integrated Ethernet, and 32GB Embedded Multi Media Card (eMMC). The TS-453BU also provides one M.2 M-key slot for NVME and one M.2 A key and one PCIe mini with SIM slot for WiFi, 4G, LTE solutions. It also offers extensive software integration functionality, including Intel® QuickAssist Technology (Intel® QAT up to 20Gbps) to accelerate and compress cryptographic workloads.

Key Values of PUZZLE-IN003B



Intel® Atom® Process C3000

In terms of memory, PUZZLE-IN003B incorporates double the Layer 2 cache, allowing edge analytics systems to quickly access data. Atom® Processor C3000 series also support the Intelligent Storage Acceleration Library (ISA-L), a software library optimized for applications that require high data throughput and minimal latency. And the Intel® VT-c works with the Intel® Ethernet Controller integrated into the new Intel® Atom® processors to deliver I/O virtualization and quality of service (QoS) features.

Feature	Intel® Atom® Process C2000	Intel® Atom® Process C3000
Intel Atom CPU	512 KB L2	2MB or 1MB L2
Process Tech	22 nm	14 nm
Cores	Up to 8	Up to 16
Memory	DDR3, DDR 3L with ECC	DDR4 with ECC
DIMMs	UDIMM, SODIMM	UDIMM, SODIMM, RDIMM
Intel QuickAssist Technology	Up to 10Gbps bulk crypto	Up to 20 Gbps crypto+ 20 Gbps Compression
Virtuallzation	VT-x	VT-x, VT-d

Integrated 10G Interface

PUZZLE-IN003B Equips with The Intel Atom® C3000-series processors which are designed to meet such requirements with two integrated 10Gb network ports providing high-speed connections to the core network while integrated networking helps contribute to the small form-factor design of the base station.

Integrated Intel® QuickAssist Technology

In the 5G network, security is an indispensable requirement. The base station must use air interface security to connect to the user equipment (UE), and an IPsec connection to connect to the core network. The base station must support high-performance crypto algorithms like AES at the IP level and ZUC/Kasumi/Snow3G at the PDCP level.

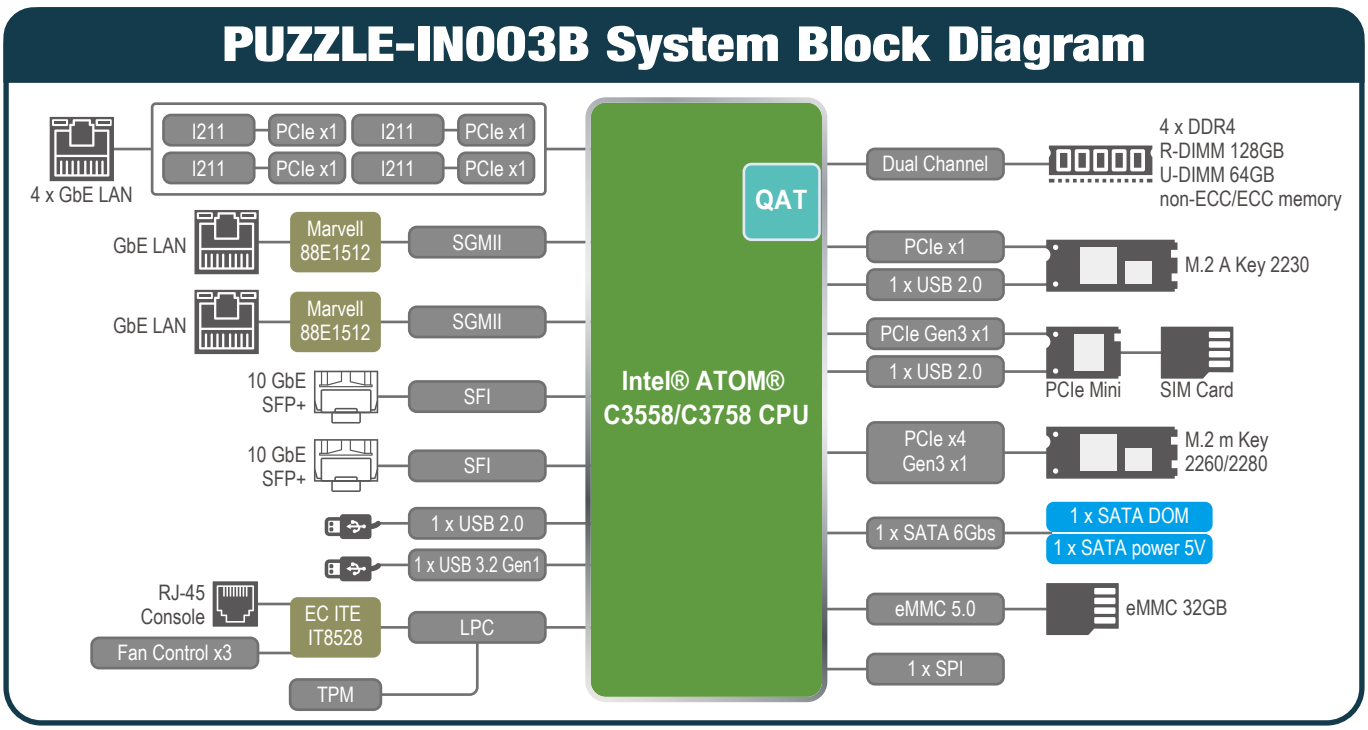
To support these requirements the Intel Atom® C3000 processor series integrates Intel® QuickAssist Technology providing up to 20 Gbps of crypto performance, ensuring secure data transfer while reserving valuable processor cycles for other tasks.

Intel® Atom® C3000 QuickAssist Technology Performance

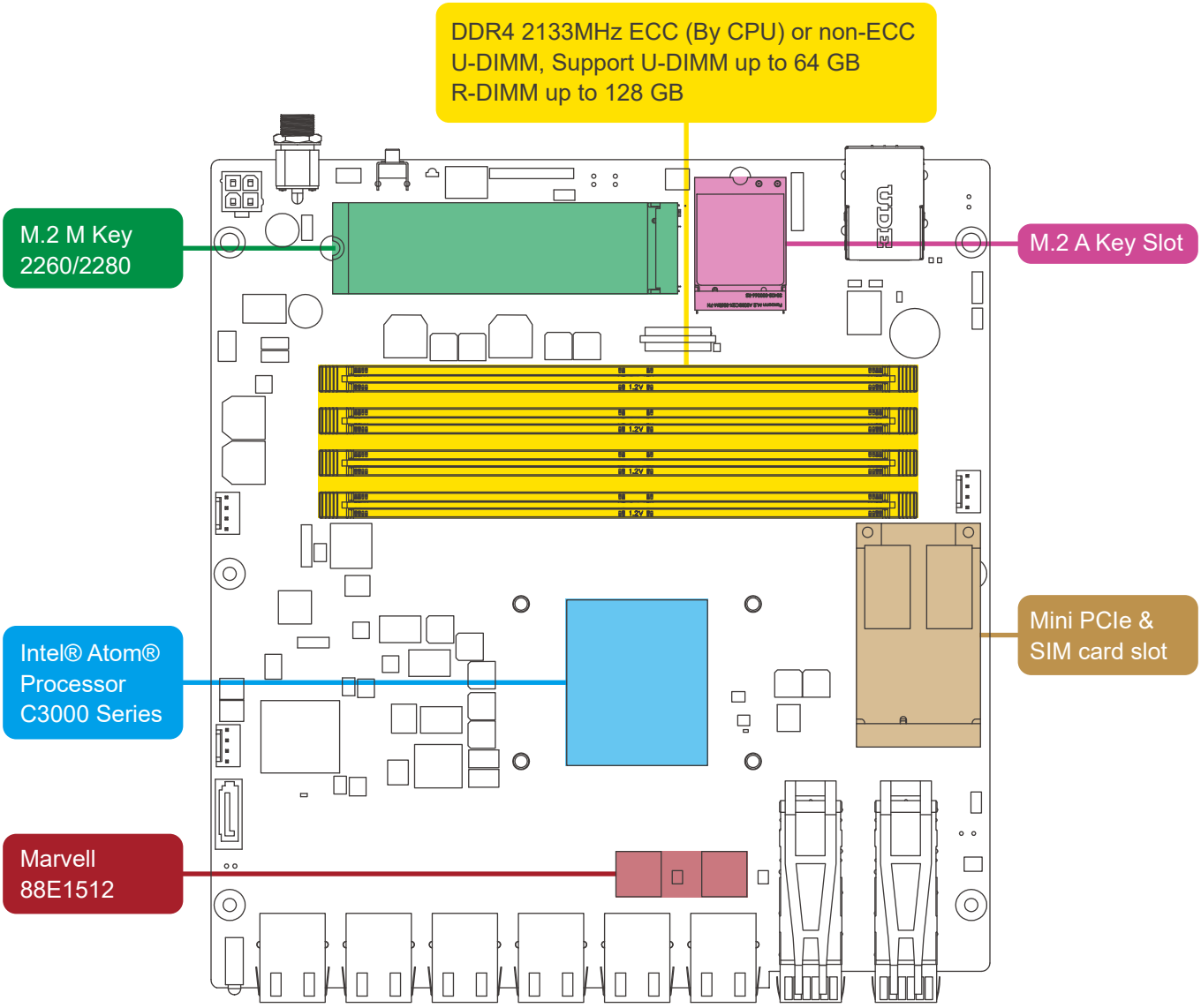
Performance	Single Intel® Atom® C3000-NS Solution
SSL	20 Gbps
Bulk Crypto + Authentication	20 Gbps
RSA Decrypt 1024	92K Ops/sec
RSA Decrypt 2048	20K Ops/sec
ZUC/Snow3G/Kasumi F82	12Gbps

PUZZLE-IN003B Intel® Atom® Processors Family

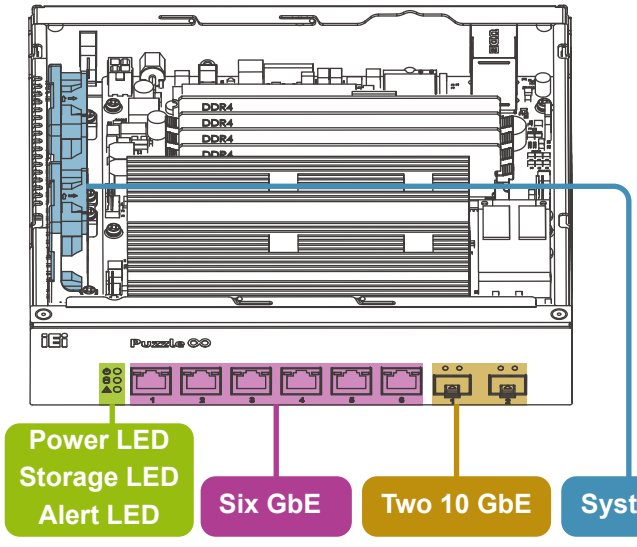
PUZZLE-IN003B System Block Diagram



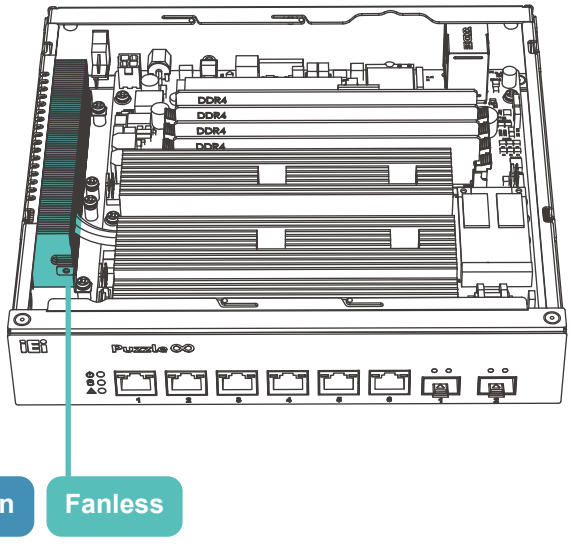
PUZZLE-IN003 Support Various Expansion Card



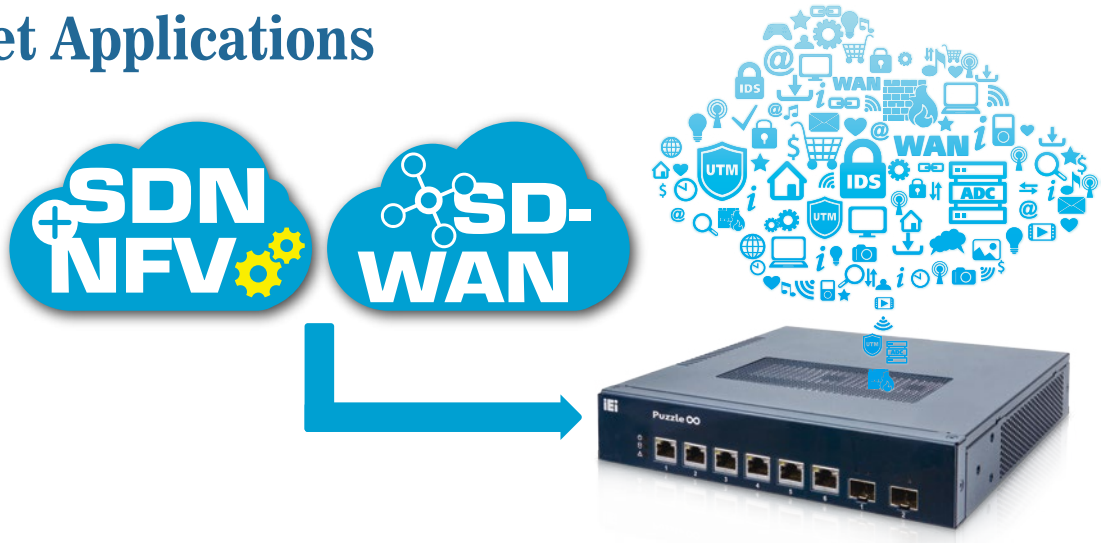
PUZZLE-IN003B-C0



PUZZLE-IN003B-C1



Target Applications



PUZZLE-IN003B enable advanced NFV and SDN capabilities for service providers' next-generation networking infrastructure, spanning from the enterprise to the data center.

uCPE (Universal Customer Premise Equipment)

Highly parallelized CPU ideal for Network Function Virtualization (NFV) and Software Defined Network (SDN)

Proprietary Network Appliance

- Security for business critical network data
- HW encrypted multi-tenant security
- High I/O for network connectivity
- Memory capacity for large traffic datasets

Unified Threat Management (UTM)

Unified threat management or UTM is a single network appliance for all-inclusive security functions, such as network firewall, intrusion detection/prevention system (IDS/IPS), anti-virus gateway, anti-spam gateway, VPN, content filtering, load balancing, data loss prevention and appliance monitoring.

UTM appliances offer cost-effective, all-in-one security ideal for small/medium businesses, remote offices and retail networks.

Intrusion Detection System (IDS)

An intrusion detection system (IDS) is a device that monitors a network or systems for malicious activity or policy violations. Any malicious activity or violation is typically reported either to an administrator or collected centrally using a security information and event management (SIEM) system. A SIEM system combines outputs from multiple sources, and uses alarm filtering techniques to distinguish malicious activity from false alarms.

Next Generation Firewall (NGFW)

Both NGFW and traditional firewalls aim to serve the same purpose of protecting an organization's network and data assets, but the most important differences between traditional and next-generation firewalls is that NGFW offer a deep-packet inspection function that goes beyond simple port and protocol inspection by inspecting the data carried in network packets.

Application Delivery Controller

An application delivery controller (ADC) is a computer network device to improve the performance of web applications in a data center and it also could be a part of an application delivery network (ADN). In order to deal with the increasing demands of Internet traffic, application delivery controllers (ADC) also provide load balancing, and support multi-tenancy for deployment in data centers and a large number of sessions with a fast transaction rate.

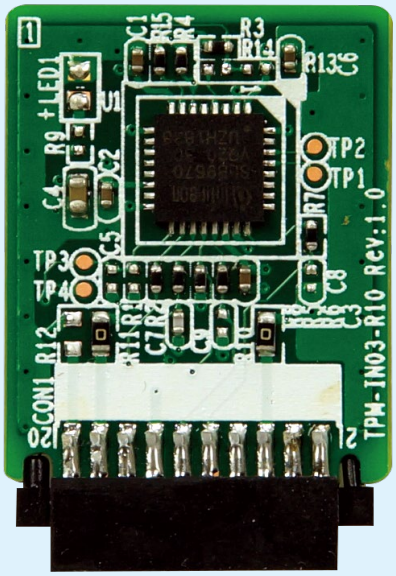
Protecting Integrity and Authenticity of PUZZLE-IN003

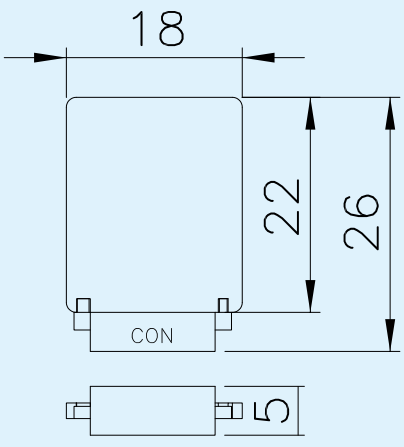
PUZZLE-IN003 support TPM (Trusted Platform Module) which offers a broad portfolio of standardized security controllers to protect the integrity and authenticity of systems. With a secured key store and support for a variety of encryption algorithms, TPM security chips provide robust protection for critical data and processes through their rich functionality.

What is a TPM?

Trusted Platform Module (TPM) is an international standard for a secure cryptoprocessors that can securely store critical data such as passwords, certificates and encryption keys. TPM is a dedicated microcontroller designed to secure hardware by integrating cryptographic keys into devices and is used for secured crypto processes within computing devices as well as for secured storage of critical data. TPMs are typically used in business laptops, routers and embedded and IoT devices. The technical TPM specification was written by an industry consortium called Trusted Computing Group (TCG).

TPM-IN03





(Unit: mm)

Specifications

- Interface
  SPI interface
- Solution
  Infineon SPI TPM 2.0 with SLB9670VQ2.0 FW7.85
- Management Tool Function
  1. TPM management
  2. File & Folder En/De-cryption
  3. Personal secure drive
  4. Secure email
  5. Key transferring
  6. Security policy configuration
  7. SPI interface
- Market Segment
  Complete TPM 2.0 function
- OS Support: Windows® & Linux
- Operating Temperature: 0°C ~ 60°C
- Storage Temperature: -20°C ~ 70°C
- Operating Humidity: 5% ~ 95%, non-condensing
- Dimensions (LxW): 26mm x 18mm

Packing List

1 x 20-pin TPM module

Ordering Information

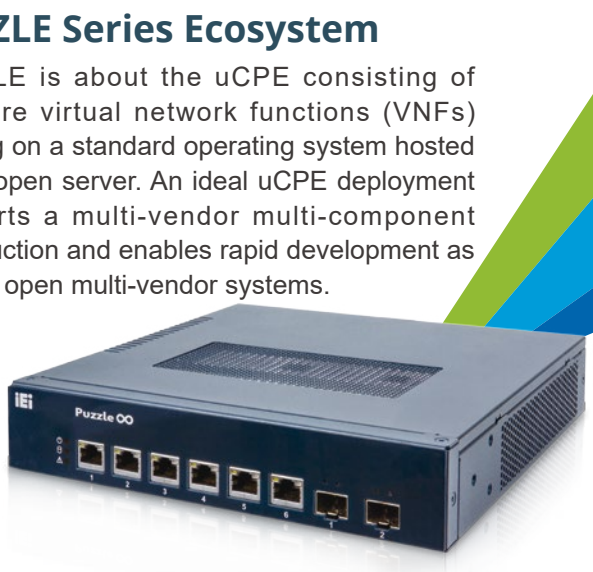
Part No.	Description
TPM-IN03-R10	20-Pin Infineon SPI TPM 2.0 module with SLB9670VQ2.0, software management tool, firmware v7.85.

PUZZLE Series Technology

Virtualization is the process of creating a software-based, or virtual, representation of something, such as virtual applications, servers, storage and networks. Network functions virtualization or NFV is a network architecture concept that uses the technologies of IT virtualization to virtualize entire classes of network node functions into building blocks that may connect, or chain together, to create communication services.

PUZZLE Series Ecosystem

PUZZLE is about the uCPE consisting of software virtual network functions (VNFs) running on a standard operating system hosted on an open server. An ideal uCPE deployment supports a multi-vendor multi-component construction and enables rapid development as well as open multi-vendor systems.



User Space

FD.io, OPNFV, OpenFastPath, OvS, DPDK, OpenDataPlane

Kernel Space

ubuntu, OpenWrt, Linux KVM, docker

Hardware

Intel, MARVELL, BROADCOM, CAVIUM, AQUANTIA, Mellanox, NXP

PUZZLE Series is Ready for Next Generation Network

The following picture completely shows the components of the PUZZLE series. Choose the right components from CPU, NIC, software, manufacturing side, and fit them together. You will create a perfect network appliance.

Software/ Application

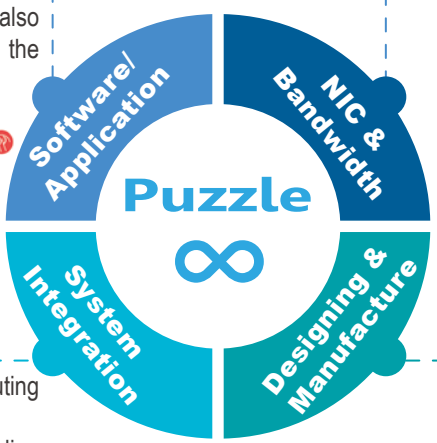
On the left hand side, it shows the S/W support from IEI. IEI will help customers to get device driver, application, other NFV basic software, DPDK, OvS, VPP, OpenDaylight and OpenStack. IEI will also help customers to deploy and install all of the software and build up their own NFV solutions.

Device Driver Application

NIC & Bandwidth

On the upper side, it shows the network connection ability of the PUZZLE series.
IEI provides four brands of NIC from Aquantia, Intel, Broadcom, Mellanox, and with 1G, 2.5G, 5G, 10G or 25G different kinds of speed.

10/100Mb, 1G, 2.5G, 5G, 10G 25G, 100G



System Integration

On the right hand side, it shows the computing ability of the PUZZLE series.
IEI implements 5 major CPU brands, including Intel, AMD, Marvell, NXP, Cavium, and 3 kinds of accelerator cards for edge computing or AI computing.

Designing & Manufacture

On the bottom side, it shows ARMOR Link cross IEI cross QNAP.
Most of network appliances are about network security. Some of the customers care about where the network appliance is designed and made. Therefore, we provide you two choices, designed and manufactured in Taiwan or in China. QNAP factory is in New Taipei City, Taiwan, and ARMOR Link factory is located in Shanghai, China.

PUZZLE-IN003B

Desktop Network Appliance with Intel® Atom® Processor C3000 Processor support up to 6 x 1 GbE, 2 x 10 GbE & 2 x M.2 slots, 1 x PCIe Mini, 1 x eMMC 32GB

Features

- Intel® Atom® processor C3558 8M Cache, up to 2.20 GHz
- Support 4 x 1 GbE NIC via Intel® C3558, 2 x 1 GbE PHY via Marvell 88E1512, 2 x 10 GbE SFP+ via intel C3558
- DDR4 2133MHz ECC (by CPU) or non-ECC UDIMM/R-DIMM Up to 32GB
- 1 x M.2 A key (USB 2.0, PCIe x1), 1 x miniPCIe (USB 2.0, PCIe x1) with SIM card slot, 1 x eMMC 32GB

Specifications

		PUZZLE-IN003B-C0	PUZZLE-IN003B-C1
Platform	Form Factor	Desktop	
	CPU	Intel® Atom® processor C3758 16M cache, up to 2.20 GHz	Intel® Atom® processor C3558 8M cache, up to 2.20 GHz
	Chipset	Integrated in CPU	
Memory	Memory Technology	DDR4 2133MHz ECC (By CPU) or non-ECC UDIMM, Support DDR4 RDIMM	
	Memory Capacity	UDIMM up to 64GB / RDIMM up to 128GB	
	Memory Socket	4 x 288-pin DIMM	
Network and Security	Network Acceleration and Security Function	• Intel® AES New Instructions • Intel® Software Guard Extensions (Intel® SGX) • Intel® Memory Protection Extensions (Intel® MPX) • Intel® Virtualization Technology for Directed I/O (VT-d) • Intel® QuickAssist Technology (Intel® QAT)	• Intel® AES New Instructions • Intel® Software Guard Extensions (Intel® SGX) • Intel® Virtualization Technology for Directed I/O (VT-d) • Intel® QuickAssist Technology (Intel® QAT)
	TPM	1 x TPM 2.0 pin header	
Networking	Ethernet IC	1 GbE NIC: Intel® i211-AT 1 GbE PHY: Marvell 88E1512 10 GbE: Intel® X553 integrated in CPU	
	Ethernet Port	4 x 1GbE from Intel® i211-AT 2 x 1GbE from Marvell 88E1512 2 x 10 GbE SFP+	
	Network Module Slot	N/A	
Expansion Slot	PCIe Slot	N/A	
	PCIe Mini Card Slot	1 x PCIe Mini card (PCIe 3.0, USB 2.0) with SIM slot	
	M.2	1 x M.2 A key (PCIe 3.0& USB 2.0)	
Storage	Storage	1 x SATA 3.0 + 1 x 5V power connector (for SATA DOM) 1 x M.2 M key 2260/2280 Support PCIe 3.0 x4 nVME	
	eMMC	1 x eMMC 32GB	
	SD Card	N/A	
External I/O	USB	1 x USB 2.0 1 x USB 3.2 Gen 1	
	Console	1 x RJ-45	
Internal I/O	HDMI	N/A	
	USB	N/A	
Power and Mechanical	Power Switch	1 x Power switch	
	Reset Button	1 x Reset button	
	Power Input	1 x DC jack	
	Type/Watt	12 V DC-in, 60W	
	Processor Cooling	Passive CPU heatsink	
	System Cooling	Two system fans	Fanless
	Antenna Hole	2 x Antenna hole	
Physical and Environmental	Storage Temperature	-20°C ~ 75°C (-4°F ~ 167°F)	
	Operating Temperature	0°C ~ 40°C (32°F ~ 104°F)	
	Operating Humidity	5% ~ 90% non-condensing	
	Dimensions (W x L x H) (mm)	225 x 206 x 44.2	
	Weight	2 kg	
OS and Certifications	Certification	CE / FCC	
	Operating System	Linux Ubuntu 18.04.04 CentOS 7 / Red Hat / Fedora EPEL Microsoft Windows 10	
Indicators	LCM	N/A	
	LED	1 x Power LED, 1 x Storage LED, 1 x Alert LED	

PUZZLE-IN003B

I/O Interface

Power LED
Storage LED
Alert LED

Six GbE

Two 10 GbE

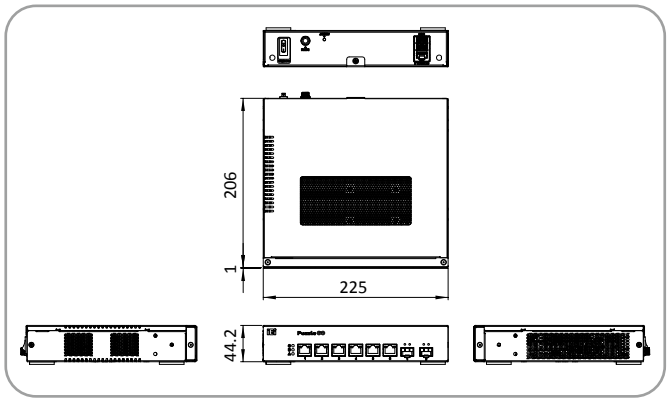
CONSOLE
USB 2.0
USB 3.0

Reset

DC/IN

Power

Dimensions (Unit: mm)



Packing List

	PUZZLE-IN003B-C0/8G-R10	PUZZLE-IN003B-C1/8G-R10
Power cord	1	1
Power adapter	1	1
Rack mounting ears	2	2
Screws for rack mounting ears	6	6
USB to console cable	1	1
RS-232 to console cable	Option	Option

Ordering Information

Part No.	Description
PUZZLE-IN003B-C0-R10	Desktop network appliance with Intel® ATOM® C3758 processor, 4 x DDR4 slots, 6 x 1GbE, 2 x 10 GbE & 2 x M.2 slots, 1 x PCIe Mini, 1 x eMMC 32GB, RoHS
PUZZLE-IN003B-C0/8G-R10	Desktop network appliance with Intel® ATOM® C3758 processor, one 8GB DDR4, 6 x 1GbE, 2 x 10 GbE & 2 x M.2 slots, 1 x PCIe Mini, 1 x eMMC 32GB, RoHS
PUZZLE-IN003B-C1-R10	Desktop network appliance with Intel® ATOM® C3558 processor, 4 x DDR4 slots, 6 x 1GbE, 2 x 10 GbE & 2 x M.2 slots, 1 x PCIe Mini, 1 x eMMC 32GB, RoHS
PUZZLE-IN003B-C1/8G-R10	Desktop network appliance with Intel® ATOM® C3558 processor, one 8GB DDR4, 6 x 1GbE, 2 x 10 GbE & 2 x M.2 slots, 1 x PCIe Mini, 1 x eMMC 32GB, RoHS

Options

Item	Part No.	Description
USB to console cable	32013-004000-100-RS	ROUND CABLE; LAN CABLE; FTDI Console Cable; 2; 1800MM; (A)USB A TYPE 4P MALE+PCB:FTDI_FT232RL; (B)RJ-45 8P8C; RoHS
RS-232 to console cable	32005-005100-100-RS	ROUND CABLE; RS-232/422/485; PUZZLE RS-232 Cable; 2; 500MM; 24AWG; (A)D-SUB 9P MALE+#4-40 Screw; (B)RJ-45 PLUG 8P8C; ONE PCS PKG; TC&C; RoHS

*Specifications are subject to change without prior notice.

Headquarters
威強電工業電腦 IEI Integration Corp.
No. 29, Zhongxing Rd., Xizhi Dist., New Taipei City 221, Taiwan
TEL : +886-2-86916798 / +886-2-26902098 FAX : +886-2-66160028
sales@ieiworld.com www.ieiworld.com

America
IEI Technology USA Corp.
138 University Parkway, Pomona, CA 91768
TEL : +1-909-595-2819 FAX : +1-909-595-2816
sales@usa.ieiworld.com usa.ieiworld.com

China
威强电工业电脑 IEI Integration (Shanghai) Corp.
上海市闵行莘庄工业区申富路515号
515, Shen Fu Rd., Xin Zhuang Industrial Develop Zone, Shanghai, 201108, China
TEL:+86-21-3116-7799 FAX:+86-21-3462-7797
sales@ieiworld.com.cn www.ieiworld.com.cn

2020.06

Puzzle ∞

iEi®

PUZZLE-IN003B

IEI Puzzle with Intel® Solution

UTM IDS

www.ieiworld.com

intel IoT Solutions Alliance

2020.02