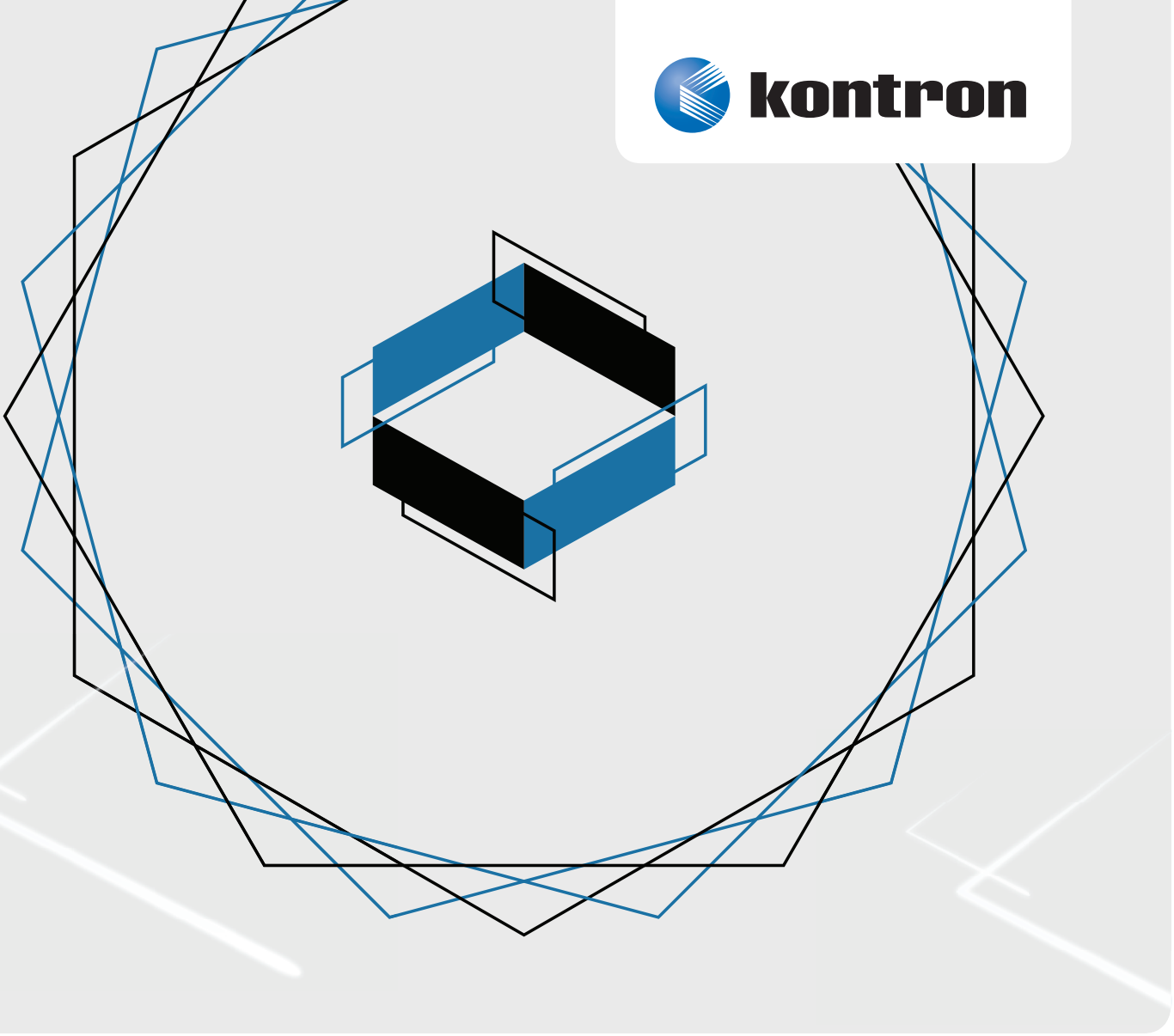


kontron

» SYMKLOUD Series «

Massively Scalable SDN/NFV-enabled Converged Cloud Infrastructure Platform

Highly efficient application workloads for:

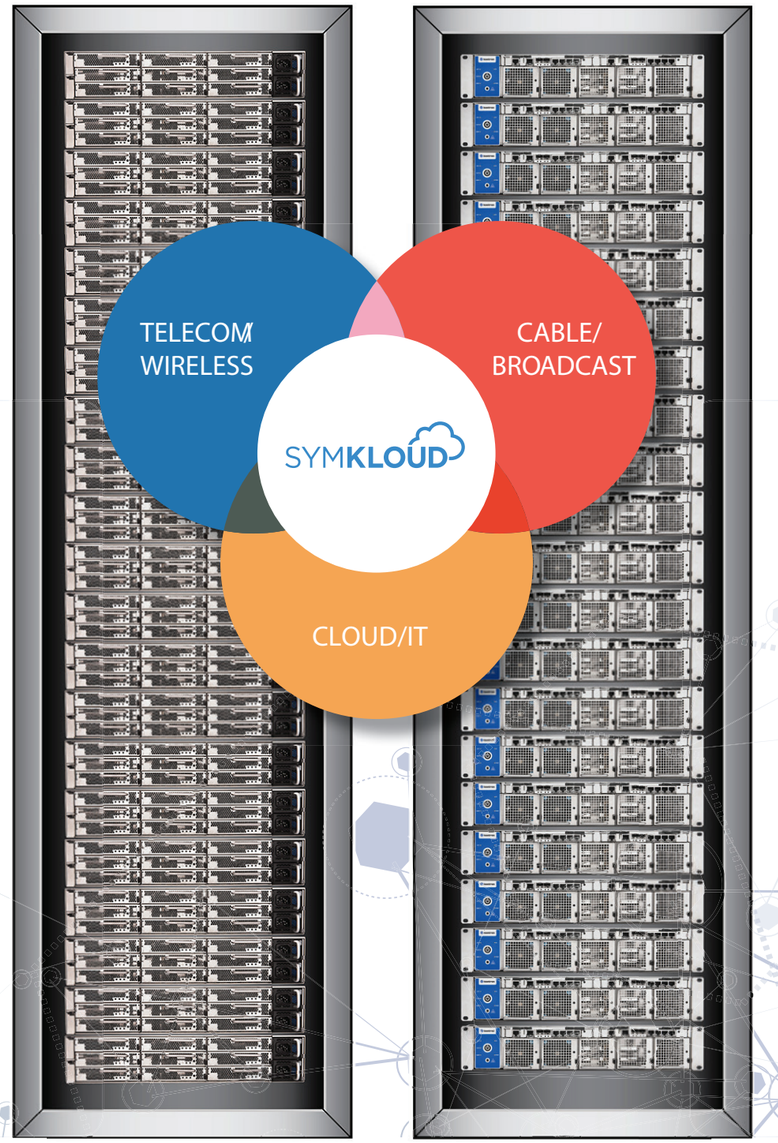
- » Video/Content Delivery
- » Big Data/IoT
- » Mobile/Telco
- » Cloud services

» Hardware Designed for a Software-Defined World «

» Converged COTS Cloud Infrastructure

Compute. Storage. Networking.

SYMKLOUD is a unique converged platform concept, designed from the ground up for cloud/IT and NFV/SDN cable and carrier cloud infrastructure deployments



SYMKLOUD

intel Intelligent Systems Alliance Premier

openstack FOUNDATION SPONSOR

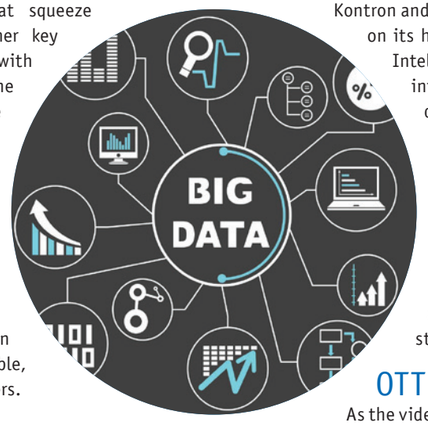
- » Modular and Compact HA Design 2U – 21" Depth
- » Hot-Swappable Redundant 1GbE or 10GbE Switches and Shelf Management
- » Supports OpenFlow for Software Defined Networks (SDN) deployments
- » Seamless OpenStack integration to provision highly scaleable instances
- » Mix and Match Massively Scalable Intel-Based Modular Servers (9 per 2U)
- » External storage (SAN) support via FCoE and iSCSI
- » Ideal for Bare Metal Hypervisor implementations
- » Traffic Shaping via 10G switch
- » Physical separation of Data Plane and Control Plane per Modular Server
- » Elegant web-based System Manager for health monitoring and 1-click updates
- » Flexible configurations to run multiple concurrent applications
- » PCIe module expansion via new Modular Server for additional storage, security, and SDI video acquistion

REAR ACCESS **FRONT ACCESS**

» Build Your Solutions «

High Performance Cloud Computing

Cloud infrastructure is increasingly the solution for service providers across all industries to efficiently and flexibly manage and deliver services. Consequently, this trend has enforced the industry to rethink hardware server designs that squeeze the highest compute densities with other key functionalities – such as L3 switching with Traffic Shaping plus a separated Data Plane and Control Plane per server– into a more compact, rack-friendly size. Add to the mix intelligent power management, load balance options, tooless hot-swappable FRUs, plus redundancy options for switch and compute resources, and you have the most complete cloud computing hardware solution on the market. Symkloud is designed from the ground, up, to efficiently tackle any massively scaled application deployed in data centers for the telecom, cable, broadcast, and private/public cloud providers.



OpenStack

Build and control your cloud with Symkloud platforms using OpenStack, the open source cloud OS. Thanks to the Symkloud modular design it is seamless to manage massive clusters of Kontron Symkloud compute (Icehouse), block storage (Cinder) and networking (neutron) resources. Moreover, Symkloud is ideal for supporting Bare Metal provisioning in the management of separate physical instances.

Big Data / Hadoop

Big Data tools such as the open-source Hadoop software-based framework enables users to store an increasingly voluminous number of files and quickly and efficiently process the vast amount of data those files hold. A cluster of SYMKLOUD platforms integrated with open source OpenStack cloud provisioning software and Hadoop can achieve significant performance gains in half the footprint that it would take standard hardware servers to perform the same amount of data analytics.

Media Transcoding / CDN

Kontron and Intel are turning the video delivery industry on its head. Symkloud supports the 4th generation Intel Core i7 Series processor featuring the integrated Iris™ Pro Graphics that is perfectly designed to do all the heavy lifting when it comes to video workloads, such as transcoding. With a single 2RU Symkloud, ISVs can achieve a channel density of up to 180 live 1080p HD video streams or up to 10x real-time VoD HD offline transcoding per file. And with the growing popularity of 4K television, one Symkloud also delivers up to 2x 4K / HEVC @60p live streams.

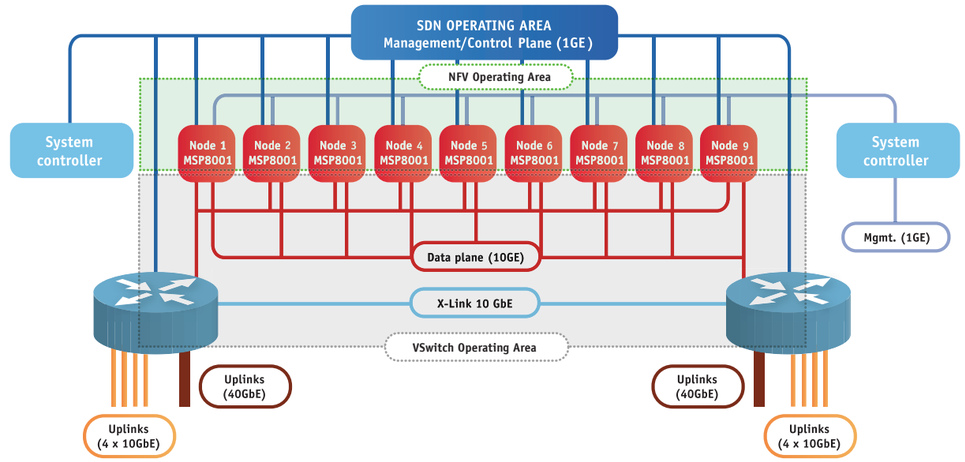
OTT Cloud/ nPVR

As the video and television viewing habits are changing rapidly for CSPs, Cable Operators and Boradcasters, so too is the network infrastructure that supports the acqusition, collecting, storing and deliverying of video to any device at any time. With a move to all-IP cloud based infrastrucure, the Kontron Symkloud Series is the ideal platform for SDI/4K content ingestion, caching with extremely fast, high capacity 2TB SSD storage modules (up to 18TB per 2RU Kontron) for end-user cloud-based Personal Video Recorders (nPVR) for on-demand and live linear feeds.

» Prime Use Cases Applicable To Symkloud «

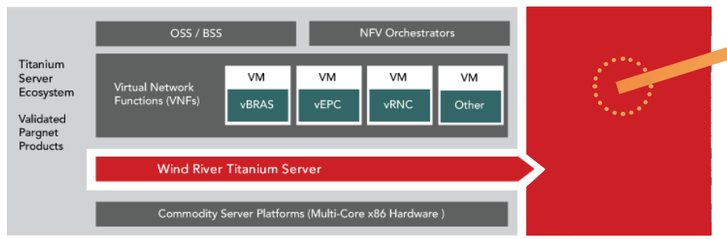
Carrier Grade NFV/SDN

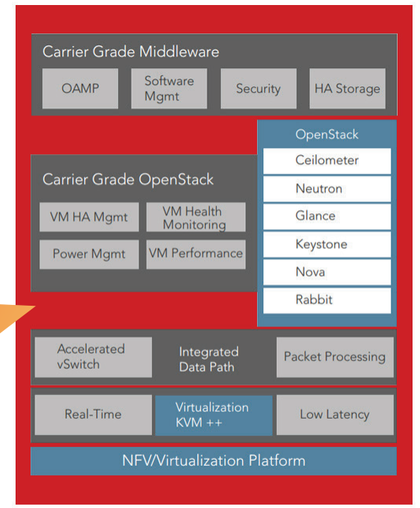
Communication Service Providers (CSPs) with carrier cloud data center deployments need the highest service levels with "Always On" applications. As CSPs move from purpose built systems to standard commercial-off-the-shelf (COTS) server hardware as their underlying NFV/SDN infrastructure, the challenge to maintain up to six-nines reliability remains. The Kontron Symkloud platform is hardware specifically designed for software defined networks that run virtualized network functions. Kontron is working with key ecosystem partners and ISVs to help ensure CSPs have the full breadth of options to make Symkloud fully enabled for their NFV and SDN deployments.



Wind River Titanium Cloud

Kontron is a member of the Wind River Carrier Grade NFV Ecosystem to demonstrate the interoperability of its Titanium Server for Network Functions Virtualization (NFV) on Symkloud. Wind River Titanium Server is a fully integrated and feature-complete NFV software platform and enables Symkloud platforms to achieve the ultra-reliability and high performance mandated for telecom networks. It delivers six 9s (99.9999%) reliability compared to the three 9s of virtualized platforms based on common enterprise software designed for IT. Based on open source and open industry standards, but with the carrier grade extensions required, Titanium Server enables service providers to maintain the rigorous uptime required as networks transition to a virtualized infrastructure.





Open Source

» Symkloud Defined «

Symkloud MS2900

» 2U converged cloud infrastructure platform with redundant hot-swappable **1GbE switches**

» Supports **OpenStack** implementations

» Switches support Dual 1GbE Data Plane / Dual 1GbE Control Plane to each Modular Server (up to 9); plus 8x 1GbE and 4x 10GbE Uplinks; up to 2x 10GbE optional Rear System Uplinks; two management 10/100/1000 Base-T RJ45 ports

» Hot-swappable and redundant front-access fans

» Web-based System Manager 2.0

» Product life cycle support (5-7 years)

» Supported Modular Servers: MSP8000, MSP8020/1, MSP803x (Max: 2), MSP8001 (Max: 2)

Symkloud MS2910

» 2U converged cloud infrastructure platform with redundant hot-swappable **10GbE switches**

» Supports **OpenStack/NFV/SDN** implementations

» Switches support Dual 1GbE Data Plane / Dual 10GbE Control Plane to each Modular Server (up to 9); plus 8x 10GbE and 2x 40GbE Uplinks; up to 2x 40GbE optional Rear System Uplinks; two management 10/100/1000 Base-T RJ45 ports

» Hot-swappable and redundant front-access fans

» Web-based System Manager 2.0

» Product life cycle support (5-7 years)

» Supported Modular Servers: MSP803x, MSP8001, MSP8000, MSP8020/1

Web-based System Manager 2.0

Monitor and manage Symkloud platforms individually or collectively with System Manager 2.0 Console

Health Management:
Quickly diagnose hardware issues with power supplies, fan speeds, and system, switch and server components; includes PSU graphical trends to better control spikes in usage

Switch/Load Balancer/ Modular Server Management:
Software configuration consoles for switches and load balancers; power down and reset Modular Servers

Firmware Management:
Save time and resources with 1-Click Firmware updates to BIOS, FPGA, BMC components, from a single Modular Server to Multi-Platform configurations

Interfaces:
JSON RESTful API for complete custom client GUI dashboard; support for SNMP Trap alarm reporting

» Technical Overview «

Symkloud Cluster Scenarios - Quick Glance	Symkloud MS2900 MSP8020 (Dual Intel® Core i7-4860EQ GT3e Iris Pro Graphics)	Symkloud MS2910 MSP8001 (Intel® Xeon® E3-1275v2)
Max platforms per 40U	20 (2x 1U Top of Rack Switch/Load Balancer - SDN Ready)	20 (2x 1U Top of Rack Switch/Load Balancer - SDN Ready)
Total Nodes per 40U	360 Nodes	180 Nodes
Total Cores per 40U	1440 CPU Cores + 360 Iris Pro GPUs	720 CPU Cores
Total Memory per 40U	5.76 TB DDR3 memory	5.76 TB DDR3 memory
Total Storage per 40U	172.8 TB M.2 SSD	360 TB HDD or SDD
Total Data Traffic per 40U	480 Gbps Data Traffic	2.4 Tbps Data Traffic
Total Switching Capacity per 40U	2.56 Tbps Switching Capacity	12.8 Tbps Switching Capacity

Technical Information	Modular Servers (MS)	
	MSP8001 Intel® Xeon® E3-1275v2 processor Dual 10GbE Data Plane; Dual 1GbE Control Plane Up to 32GB DDR3 memory on 4 DIMM per CPU Dual 2.5in HDD or SDD; up to 2TB total capacity Ubuntu Server Edition; Red Hat Enterprise Linux Server; Windows Server 2008	**MSP8000** Intel® Xeon® E3-1275v2 processor Dual 1GbE Control Plane Up to 32GB DDR3 memory on 4 DIMM per CPU Dual 2.5in HDD or SDD; up to 2TB total capacity Ubuntu Server Edition; Red Hat Enterprise Linux Server; Windows Server 2008
	MSP8020 Dual (2x) Intel® i7-4860EQ GT3e Iris Pro processor 16GB of DDR3 memory on 2 DIMM per CPU Dual 1GbE Data Plane / Dual 1GbE Control Plane Up to 480GB M.2 SSD storage per CPU Ubuntu Server Edition; CentOS Linux; Windows 7	**MSP8021** Dual (2x) Intel® i7-4700EQ processor 16GB of DDR3 memory on 2 DIMM per CPU Dual 1GbE Data Plane / Dual 1GbE Control Plane Up to 480GB M.2 SSD storage per CPU Ubuntu Server Edition; CentOS Linux; Windows 7
	MSP803x Intel® i7-4860EQ GT3e Iris Pro processor PCIe-x8 Gen 3 Expansion Slot* for half-length PCIe hardware acceleration modules (*Note: any new modules need to complete Kontron internal validation process) Dual 10GbE Data Plane; Dual 1GbE Control Plane 32GB of DDR3 on 2 DIMM memory per CPU; up to 480GB M.2 SSD storage per CPU CentOS Linux; Windows 7; Ubuntu Server Edition	**MSP8031** Intel® i7-4700EQ processor PCIe-x8 Gen 3 Expansion Slot* for half-length PCIe hardware acceleration modules (*Note: any new modules need to complete Kontron internal validation process) Dual 10GbE Data Plane; Dual 1GbE Control Plane 32GB of DDR3 on 2 DIMM per CPU; up to 480GB M.2 SSD storage per CPU CentOS Linux; Windows 7; Ubuntu Server Edition
	MSP8030 BD Intel® i7-4860EQ GT3e Iris Pro processor High speed 2TB Storage SDD PCIe Expansion module (Intel P3600 and P3700); Total system capacity of 18TB Dual 10GbE Data Plane; Dual 1GbE Control Plane 32GB of DDR3 memory on 2 DIMM per CPU; additional M.2 SSD storage, up to 480GB per CPU CentOS Linux; Windows 7; Ubuntu Server Edition	
	MSP8030-VA Intel® i7-4860EQ GT3e Iris Pro processor PCIe Expansion module for SDI Video Acquistion (Matrox X.mio3 LP): eight reconfigurable SDI I/Os from SD to 4K; Dual 10GbE Data Plane; Dual 1GbE Control Plane 32GB of DDR3 on 2 DIMM memory per CPU; additional M.2 SSD storage, up to 480GB per CPU CentOS Linux; Windows 7; Ubuntu Server Edition	

» Maximize Rack Space:

Compact form-factor (2U high; 21-inches depth) with modular compute, storage and networking reduces need for extra Top of Rack equipment and fewer Fiber /Copper Cables

» Scale Clusters/Racks Efficiently:

Integrated 1GbE/10G Switching ensures platforms can cluster seamlessly

» Save Energy Costs on IT/Infrastructure:

Multifaceted approach to achieve best power efficiency and control per modular server, plus low platform power consumption with up to two AC or DC power supplies

» Simplify Platform Management:

Remote health monitoring and firmware 1-click updates via online System Manager 2.0 console

Ask about our new
Remote Access Evaluation Lab

SYMLAB

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CAPEX Savings

- **Integrated Switch**
  - — Eliminate or reduce Top of Rack space requirements
- **Common Hardware**
  - — Multiple applications on same platform
  - — Media Processing + General Processing + Storage + Switching + HA combined into one platform
  - — Fewer part numbers to manage
  - — Repurpose HW resources without changing the HW
- **High Density, Compact Platform**
  - — Ideal for physical real estate is a key factor in certain data center environments
- **Elasticity**
  - — Grow as you go; use same platform, next gen CPU updates without forklift updates

OPEX Savings

- **Switch Stacking**
  - — Switch aggregation
- **Network Functions Virtualization**
  - — Hardware Agnostic
- **Software Defined Network**
  - — Network Management Flexibility
- **Power Management**
  - — Usage Based
  - — Less cooling & power by scaling up and down based on resources required
  - — Optimize resources based on work load without HW changes in the same platform

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