MAKING THE MOST OUT OF YOUR HYBRID CLOUD INFRASTRUCTURE

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CLOUD ARCHITECTURE IS THE MOST EFFICIENT AND AGILE COMPUTING SOLUTION, REGARDLESS OF WHERE IT IS DEPLOYED.
TODAY’S DATA CENTERS MUST...

...manage an increasingly complex range of mission-critical workloads

...make difficult decisions about workload placement

...quickly deploy optimal infrastructure
NETWORK KEY FROM EDGE TO CLOUD
NETWORK TRANSFORMATION: EDGE TO CLOUD

**Edge (SD-WAN/uCPE)**
- Corporate Employees
- Mobile Employees
- Remote Employees
- Branch Offices
- Customers, Partners, Suppliers

**Cloud (SDN/NFV)**
- Public Cloud-1
- Public Cloud-2
- Public Cloud-3

**Data Center (SDN/NFV)**
- Private Cloud
- Physical
- Virtual
- Containerized

Consistent Experience
Extend Network & Security Policies to Public Cloud(s)

Drive Consistent Network Approach for Multi-Cloud

New Security & Connectivity Approach
Increased SaaS Usage
Bandwidth & Application Optimization

Consistent Network & Security across Physical, Virtual, Private Cloud, Containers
Scalable Network & Security Functions
Security Inside the Perimeter
Customers want to virtualize the network to gain...

- **FLEXIBILITY**
- **AGILITY**
- **SCALE**

**Balancing Act**

**OBJECTIVES**
- Cloud Native and DevOps for Core to Edge
- Digital Transformation of Networks
- Scale Up and Down Rapidly

**ADVANTAGES**
- High Resilience and Availability
- Enable New Revenue Streams
- Rapid Innovation & Improved Customer Experiences

**Intel Solves**

- **Complexity**
- **Interoperability**
- **Unpredictability**

Network Transformation Enables Business Transformation
INTEL LEADING OPEN SOURCE INNOVATIONS

www.intel.com/opensource

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OPEN SOURCE LEADERSHIP WITH NETWORKING

- Contributions
- Convergence
- Commercial

Networking & Automation

RAN
- ORAN Alliance
- ETSI
- Telecom Infra Project
- The Linux Foundation

Edge
- ODL Edge Foundry
- EdgeX Foundry
- Akraino Edge Stack
- Open Compute Project

Data Plane
- DPDK
- Open DAYLIGHT
- OpenStack
- ONAP
- MANO

Orchestration & Automation
- Cloud Native Computing Foundation
- Kubernetes
- CNI
- Docker
- HELM
- Kata Containers

Security
- Hyperscan.io
- Suricata
- Snort

Storage
- Storage Performance Development Kit SPDK
- Ceph

Core
- KVM
FROM COMMUNITY TO ENTERPRISE

*Other names and brands may be claimed as the property of others.
RED HAT’S VISION: OPEN HYBRID CLOUD

- Developer Tooling
- Application Platforms
  - Bare Metal
  - Virtualized
  - Infrastructure Platforms
  - Private Cloud
  - Public Cloud
- Software Defined Storage
- Management & Automation
**RED HAT NFVI INFRASTRUCTURE AND PARTNER ECOSYSTEM**

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RED HAT NFV PLATFORM, POWERED BY INTEL® XEON® SCALABLE PROCESSORS

Access the latest open source software and hardware technologies that have been optimized to work together to deliver:

- **Optimized performance**
- **Advanced security features**
- **Improved server uptime**
- **Reduced service disruptions**
- **Simple scalability**

Software and workloads used in performance tests may have been optimized for performance only on Intel microprocessors. Performance tests, such as SYSmark* and MobileMark*, are measured using specific computer systems, components, software, operations and functions. Any change to any of those factors may cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products. For more complete information visit intel.com/performance.

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INTRODUCING
INTEL® XEON® SCALABLE PROCESSORS

INTEL® XEON® PLATINUM 9200 PROCESSORS
A NEW CLASS OF ADVANCED PERFORMANCE

INTEL® XEON® PLATINUM 8200 PROCESSORS

INTEL® XEON® GOLD 6200 PROCESSORS

INTEL® XEON® GOLD 5200 PROCESSORS

INTEL® XEON® SILVER 4200 PROCESSORS

INTEL® XEON® BRONZE 3200 PROCESSORS

BUILT-IN VALUE
LEADERSHIP WORKLOAD PERFORMANCE
GROUNDBREAKING MEMORY INNOVATION
EMBEDDED ARTIFICIAL INTELLIGENCE ACCELERATION
HARDWARE ENHANCED SECURITY
ENHANCED AGILITY & UTILIZATION
INTEL SECOND GENERATION XEON SCALABLE: GREAT FOR NETWORKING TOO!

**PERFORMANCE LEADERSHIP**
- Up to 48 cores and 12 Memory channels on Advanced Performance

**WORKLOAD SPECIALIZED**
- DL Boost, Speed Select

**NATIVE PERSISTENCE**
- Support for Optane DC Persistent Memory

**INTEL® XEON® SCALABLE PLATFORM:**
THE FOUNDATION AND CATALYST FOR HYBRID CLOUD

- **DL INFERENCE**
  - Up to 17X IMAGES PER SECOND

- **VLS SPECIALIZED NFV SKUs**
  - Up to 1.5X NETWORK FUNCTION SPEEDUP

- **VISUAL CLOUD SOLUTIONS**
  - 32% LOWER COST

Performance results are based on estimates as of 12/11/2018 and may not reflect all publicly available security updates. Software and workloads used in performance tests may have been optimized for performance only on Intel microprocessors. Performance tests, such as SYSmark and MobileMark, are measured using specific computer systems, components, software, operations and functions. Any change to any of those factors may cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products. For more complete information visit http://www.intel.com/performance.
WORLD’S FIRST XEON SCALABLE PROCESSORS SPECIALIZED FOR NETWORKING/NFV

UP TO 1.23-1.58X NFV WORKLOAD PERFORMANCE IMPROVEMENT

ADDITIONAL PROCESSING HEADROOM DELIVERS ENHANCED VM/NFV CAPACITY AND DENSITY

HANDLE MORE SUBSCRIBER CAPACITY AND MOBILE SERVICES

REDUCED BOTTLENECKS FOR FIXED AND MOBILE 5G NETWORKS

NETWORKING SPECIALIZED “N” PROCESSORS

<table>
<thead>
<tr>
<th>Model</th>
<th>Cores</th>
<th>Frequency</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>6552N</td>
<td>24</td>
<td>2.3GHz</td>
<td>150W</td>
</tr>
<tr>
<td>6230N</td>
<td>20</td>
<td>2.3GHz</td>
<td>125W</td>
</tr>
<tr>
<td>5218N</td>
<td>16</td>
<td>2.3GHz</td>
<td>105W</td>
</tr>
</tbody>
</table>

FEATURING INTEL® SPEED SELECT TECHNOLOGY WITH PRIORITIZED BASE FREQUENCY (INTEL® SST-BF)

NEW IN 2019 “N”-BASED NFV SOLUTIONS

Performance results are based on testing as of dates shown in configuration and may not reflect all publicly available security updates. See configuration disclosure for details. No product or component can be absolutely secure. Software and workloads used in performance tests may have been optimized for performance only on Intel microprocessors. Performance tests, such as SYSmark and MobileMark, are measured using specific computer systems, components, software, operations and functions. Any change to any of those factors may cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products. For more complete information visit www.intel.com/benchmarks. Configurations – see backup.

VM: VIRTUAL MACHINE
NFV: NETWORK FUNCTION VIRTUALIZATION
F5 NETWORKS* BIG-IP WITH SECOND GENERATION INTEL® XEON® SCALABLE PROCESSORS AND INTEL® QUICKASSIST® TECHNOLOGY

Platform

Second Generation Intel® Xeon Scalable Platform: “N” Processors

Intel® QuickAssist (QAT) Acceleration Adapter 8970

Network Functions W/Acceleration

F5 BIG-IP Optimized!
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INTEL AND RED HAT*: BETTER TOGETHER

BETTER TOGETHER

- Have co-developed deployable architecture solutions for 20+ years
- Jointly collaborate upstream to help enable the availability of innovative open technologies
- Share a vision to accelerate, simplify, and improve Red Hat OpenShift*
- Help organizations navigate digital transformation with solutions that deliver choice, flexibility, and innovation

INNOVATION AND PERFORMANCE

Majority of Fortune 500 companies use Red Hat Enterprise Linux*1

The majority of the world's clouds are powered by Intel® Xeon® processors2

CHOICE, WITHOUT VENDOR LOCK-IN

OEMs certified for Red Hat solutions choose Intel® processors3

2 Wired. “Intel Can't Win Mobile, but It Owns the Cloud—For Now.” April 2016. wired.com/2016/04/intel-smart-declare-cloud-company-now/

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For more complete information visit www.intel.com/benchmarks.

1. F5 Networks® Gi-Lan: Configuration #1: 2x Intel® Xeon® Gold 6230N Processor on Neon City Platform with 12x 16GB DDR4 2999MHz (384GB total memory), Storage: 1x Intel® 240GB SSD, Network: 6x Intel XXV710-D2, BIOS: PLXCRB1.86B.056B.D10.1901032132, cCode: 0x4000019 (HT= ON, Turbo= OFF), OS: Ubuntu* 18.04 with kernel: 4.15.0-2-generic, Results: 54.8. Tested by Intel on 1/22/2019.

2. VPP FIB: Tested by Intel on 1/17/2019 1-Node, 2x Intel® Xeon® Gold 6230N Processor on Neon City platform with 12x 16GB DDR4 2999MHz (384GB total memory), Storage: 1x Intel® 240GB SSD, Network: 6x Intel XXV710-D2, BIOS: PLXCRB1.PFT.0569.D08.1901141837, cCode: 0x4000019 (HT= ON, Turbo= OFF), OS: Ubuntu* 18.04 with kernel: 4.15.0-2-generic, Benchmark: VPP FIB (Max Mpackets/s (64B)), Workload version: VPP v1.10 in ipv4f config, Compiler: gcc7.3.0, Results: 212.9.

3. Virtual Broadband Network Gateway: Tested by Intel on 11/06/2018 1-Node, 2x Intel® Xeon® Gold 6130 Processor on Neon City platform with 12x 16GB DDR4 2666MHz (384GB total memory), Storage: 1x Intel® 240GB SSD, Network: 6x Intel XXV710-D2, BIOS: PLXCRB1.86B.056B.D10.1901141837, cCode: 0x4000019 (HT= ON, Turbo= OFF), OS: Ubuntu* 18.04 with kernel: 4.15.0-2-generic, Benchmark: Virtual Broadband Firewall (64 Mpps), Workload version: opnfv 6.2.0, Compiler: gcc7.3.0, Results: 89.9.


5. Virtual Firewall: Tested by Intel on 10/26/2018 1-Node, 2x Intel® Xeon® Gold 6130 Processor on Neon City platform with 12x 16GB DDR4 2666MHz (384GB total memory), Storage: 1x Intel® 240GB SSD, Network: 4x Intel X710-D4, BIOS: PLXCRB1.86B.056B.D10.1901032132, cCode: 0x4000019 (HT= ON, Turbo= OFF), OS: Ubuntu* 18.04 with kernel: 4.15.0-2-generic, Benchmark: Virtual Firewall (400 Mpps), Workload version: opnfv 6.2.0, Compiler: gcc7.3.0, Results: 83.7.

6. Virtual Broadband Network Gateway: Tested by Intel on 11/06/2018 1-Node, 2x Intel® Xeon® Gold 6130 Processor on Neon City platform with 12x 16GB DDR4 2666MHz (384GB total memory), Storage: 1x Intel® 240GB SSD, Network: 6x Intel XXV710-D2, BIOS: PLXCRB1.86B.056B.D10.1901141837, cCode: 0x4000019 (HT= ON, Turbo= OFF), OS: Ubuntu* 18.04 with kernel: 4.15.0-2-generic, Benchmark: Virtual Broadband Firewall (64 Mpps), Workload version: opnfv 6.2.0, Compiler: gcc7.3.0, Results: 212.9.

7. VCSMT: Tested by Intel on 1/22/2019 1-Node, 2x Intel® Xeon® Gold 6130 Processor on Supermicro®-X11DTH-Tq platform with 12x 16GB DDR4 2666MHz (384GB total memory), Storage: 1x Intel® 240GB SSD, Network: 4x Intel XXV710-D2, BIOS: PLXCRB1.PFT.0569.D08.1901141837, cCode: 0x4000019 (HT= ON, Turbo= OFF), OS: Ubuntu* 18.04 with kernel: 4.15.0-2-generic, Benchmark: Virtual Converged Cable Access Platform (IMX Gbps), Workload version: ucmc 18.10, Compiler: gcc7.3.0, Other software: Kubernetes® 1.11, Docker® 18.06, DPDK 18.11, Results: 83.7.

8. OVS DPDK: Tested by Intel on 1/21/2019 1-Node, 2x Intel® Xeon® Gold 6130 Processor on Neon City platform with 12x 16GB DDR4 2666MHz (384GB total memory), Storage: 1x Intel® 240GB SSD, Network: 4x Intel XXV710-D2, BIOS: PLXCRB1.PFT.0569.D08.1901032132, cCode: 0x4000019 (HT= ON, Turbo= OFF), OS: Ubuntu* 18.04 with kernel: 4.15.0-2-generic, Benchmark: Open Virtual Switch (on 6P/6C/12G 64B Macpackets), Workload version: OVS 2.10.1, DPDK-17.11.4, Compiler: gcc7.3.0, Other software: GEMU-2.12.1, VPP v18.10, Results: 96. Tested by Intel on 1/18/2019 1-Node, 2x Intel® Xeon® Gold 6320 Processor on Neon City platform with 12x 16GB DDR4 2999MHz (384GB total memory), Storage: 1x Intel® 240GB SSD, Network: 6x Intel XXV710-D2, BIOS: PLXCRB1.86B.056B.D10.1901032132, cCode: 0x4000019 (HT= ON, Turbo= OFF), OS: Ubuntu* 18.04 with kernel: 4.20.0-042000c6-generic, Benchmark: Open Virtual Switch (on 4G/4P/64 64B Macpackets), Workload version: OVS 2.10.1, DPDK-17.11.4, Compiler: gcc7.3.0, Other software: GEMU-2.12.1, VPP v18.10, Results: 16.9.