DIPL.ING.(FH)KLAUS ROCK

HTTP-QuSS

HTTP - QUANTUM SPEED AND SECURITY

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February 14, 2022

ENTERPRISE - MARKET SEGMENT

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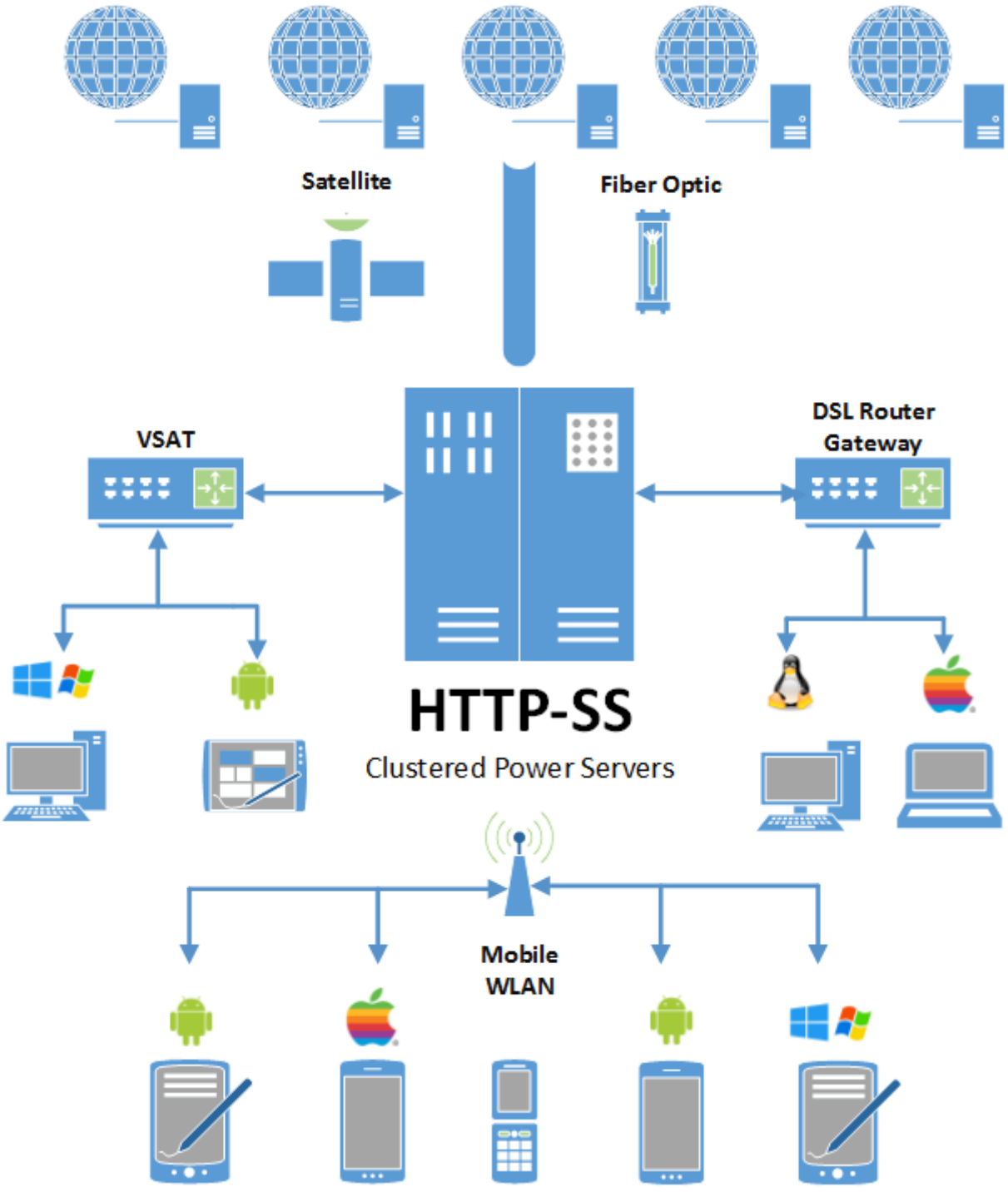
What is HTTP-QuSS

HTTP-QuSS 5G consists of a **High-Performance Computing (*HPC*) Server** and **lightweight Clients** for all OS Platforms, Routers, Gateways and Modems.

The **HTTP-QuSS 5G Server** processes and transmits URL requests to the Client Browser in such a way that up to **90 % less Data** for static and up to **50 %** for dynamic WEB Contents will be transmitted and therefor only a fractional of Bandwidth is needed to provide a similar performance as you would expect within a high Broadband Connection.



Unique Selling Proposition

- **De-Duplication**
  - ✓ Contained multiple (pure Delta Transmission on Bit-Level Reduction up to 90%)
- **Total Elimination of the Latency Problem**
  - ✓ Through new HTTP Single Stream Technology
- **Highly reduced Data Transmission for all WEB Objects**
  - ✓ By using an Algorithm on Byte Level
  - ✓ 90 % reduced Data Transmission
  - ✓ Forward Error Correction to reduce Retransmissions
- **Own solid rock Virtual Machine for Routers and Modems**
  - ✓ With its own highly efficient Process and Processor management
  - ✓ Integrated functional Language without Site Effects
  - ✓ Smart parallel Process spawning with high efficient Process Inter Communication
  - ✓ And much more …
- **100 % secure Encryption**
  - ✓ Through Transmission of Figures which depend on the Client and Server State only for a fraction of Time.
- **Pure Software Solution**
  - ✓ No need of special Hardware on Client Site
- **Fast and transparent Installation and Integration**
  - ✓ No need of Reconfigurations in existing Infrastructure
  - ✓ Fully transparent for User
  - ✓ On all Devices like PC, Laptops, Smartphones (Android, iOS), DSL- and VSAT Routers etc.

Advantages for Enterprises

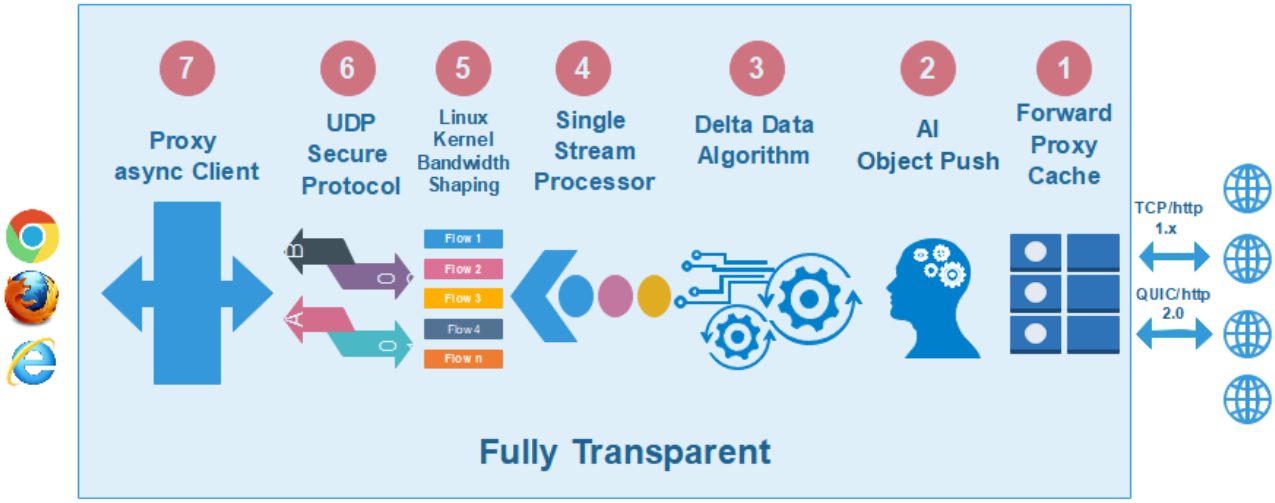
- Best use of limited Resources (Bandwidths)
- More efficient and faster Data Transmission
  - ✓ Faster WEB Page Loading
  - ✓ Significantly better Performance
- Transparent and fast Integration into existing Infrastructure
- Cost Savings
- Higher Customer Satisfaction
- New Customers, Competitive Displacement
- Image Profit

Advantages for Enterprise Users

- Can double his existing Bandwidth by simply downloading an App
- Can reduce his monthly Costs dramatically because Data Volume will be reduced by **90 %**
- Much better WEB Page Load Performance
- No upgrade of existing Provider Contracts
- In a Satellite or Mobile Network no Latency Issues
- Much better Performance for Cloud Applications
- Fast Cloud Data Backup
- Broadband Availability, even in rural Areas
- No special Hardware because only our Software is needed
- Zero Installation Scenario – no complicated Configuration – Install and Run

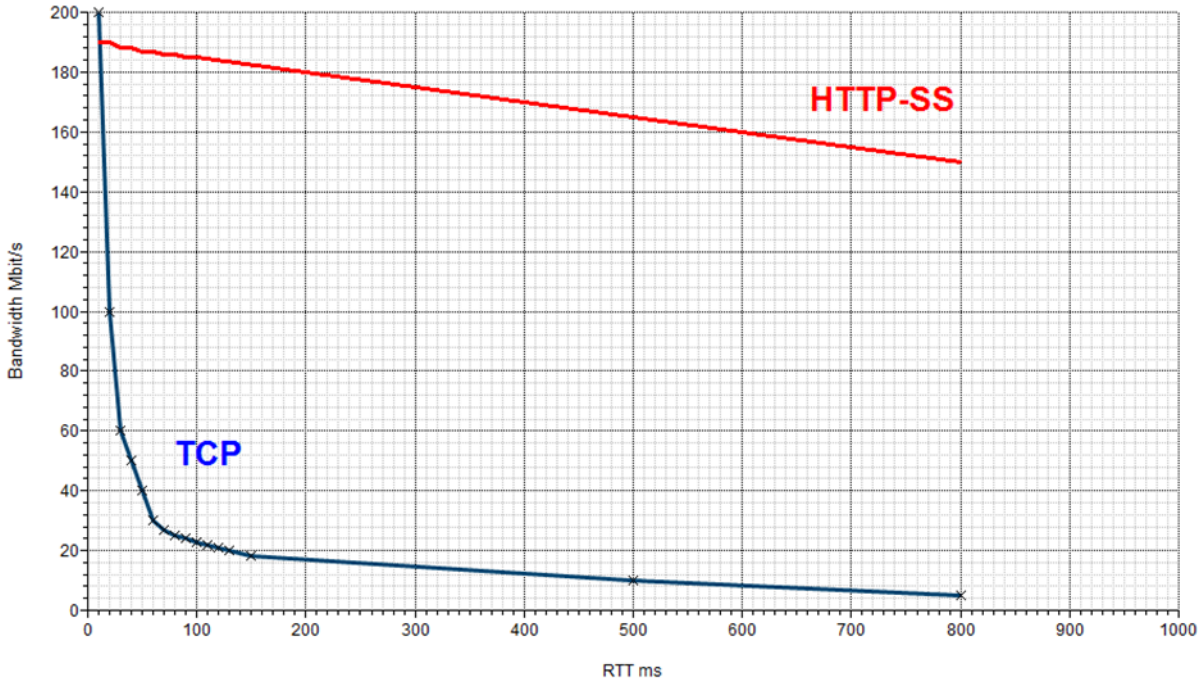
Transparent Network Integration

- No need to change Network Infrastructure by fully **transparent Network Integration**
- Supports **all common Browsers**

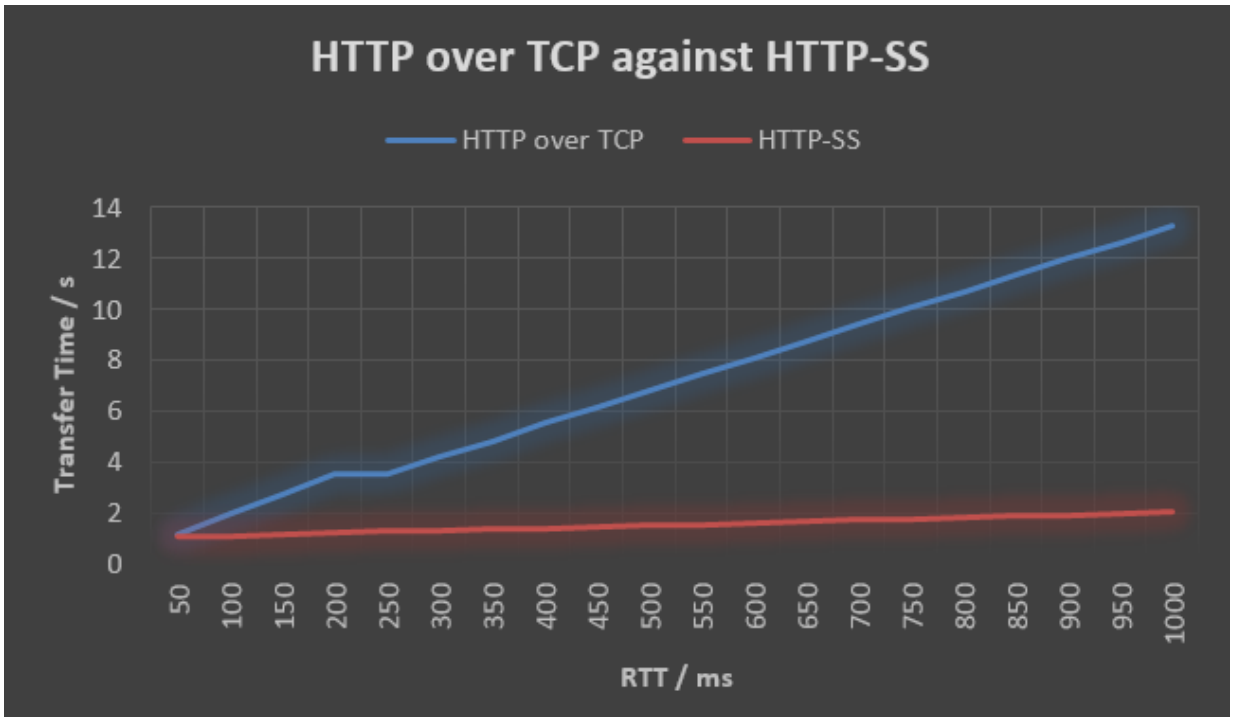


Latency Bandwidth Resistance

- **No Dependency** between **R**ound **T**rip **T**ime and **TCP Bandwidth**
- **Breakthrough** in higher bandwidths Regions even at very long Round Trips



Faster WEB Object Transfer Time



- **WEB Object Transfer Time** nearly constant even at very high Round Trips
- **50 %** better Performance within RTT Range 50 – 100 ms
- Up To **500 %** better Performance in very High Latency IP Networks
- **No visible Difference** of Browser Page Load Time within higher or very high Latency Networks
- Even much better Performance in very High Bandwidth Regions **over 50 Mbit/s**

RTT / ms	Transfer Time / s		Performance
	HTTP v. TCP	HTTP-SS uncompressed*	
50	1,16	1,07	8,41%
100	1,95	1,098	77,60%
150	2,734	1,19	129,75%
200	3,533	1,216	190,54%
250	3,535	1,272	177,91%
300	4,169	1,32	215,83%
350	4,794	1,364	251,47%
400	5,536	1,41	292,62%
450	6,166	1,465	320,89%
500	6,817	1,524	347,31%
550	7,475	1,542	384,76%
600	8,099	1,621	399,63%
650	8,728	1,665	424,20%
700	9,384	1,715	447,17%
750	10,045	1,774	466,23%
800	10,686	1,817	488,11%
850	11,31	1,874	503,52%
900	11,963	1,921	522,75%
950	12,63	1,986	535,95%
1000	13,276	2,033	553,03%

Server Hardware

IBM LinuxONE Emperor

Highlights

●● ● ● OPEN: Choose the tools and applications you know and love

●● ● ● FLEXIBLE: Meet demand with virtually limitless scale

●● ● ● SIMPLE: Fewer servers, less complexity, lower cost

●● ● ● EFFICIENT: Get unparalleled utilization and speed

●● ● ● TRUSTED: Embedded security and designed to never stop

Linux has been the world's fastest growing server operating system for a number of years and is now a major player in the global IT market, driving a multitude of new solutions. To be competitive in the market, the Linux infrastructure has to be efficient, secure, adaptive, and integrated.

It must be designed to handle the explosive growth of mobile clients, be able to leverage vast amounts of data, and provide deep real-time insight at the point of impact to facilitate better informed decision making. And it must be deployable within a secure and resilient cloud ready environment.

The IBM® LinuxONE™ Emperor system offers the necessary capabilities and processing power to be that Linux infrastructure. It can protect sensitive transactions to minimize business risk and client exposure, while providing the performance needed to help deliver on service level agreements. Emperor can provide exceptional customer experience.

Scalability and Performance

The LinuxONE Emperor allows for a simple Linux infrastructure approach. It is available with up to 141 configurable cores using the world's fastest commercial processor running at 5.0 GHz, for impressive performance and massive scaling. It can support up to 8,000 virtual Linux servers on a single footprint. That means that the virtualization capabilities in a single Emperor system can result in a less complex Linux infrastructure with fewer components, less management, less space requirements, and less software costs than x86 servers. For compared environments, it is estimated that a cloud environment on an Emperor will have a 32 percent lower total cost of ownership over three years than an x86 Cloud and a 60 percent lower total cost of ownership over three years than a public cloud.

Emperor is a responsive service delivery platform capable of starting up hundreds of new virtual Linux servers in minutes. It allows you to share and over-commit system resources to meet your client expectations for unlimited access to existing and new services. LinuxONE supports multiple Linux Distributions such as Red Hat (RHEL), SUSE (SLES) and Canonical (Ubuntu). Virtualization capabilities are delivered by KVM or IBM z/VM hypervisors. The OpenStack support for KVM and IBM z/VM allows for cloud like management, with 3rd party tools such as by VMware vRealize™ Automation™.

Impressive scalability is provided by the virtualization alternatives to fully exploit the Emperor capabilities to meet your mobile and analytic demands. It can run at utilization rates as high as 100 percent for extended periods of time, and you can scale your capacity on demand. Having your Linux environment all in one server also means less time is spent on managing your Linux infrastructure.

Trustful, reliable and secure for less risk

Within a single footprint, a LinuxONE Emperor is designed to avoid or recover from failures to minimize business disruptions. High availability is realized through component reliability, redundancy, and features that assist in providing fault avoidance and tolerance, as well as permitting concurrent maintenance and repair.

Emperor provides privacy for transactions and sensitive data by employing a dedicated cryptographic coprocessor, the CP Assist for Cryptographic Function (CPACF), which delivers cryptographic and hashing capabilities in support of clear-key operations. Exclusive to CPACF is the protected key support which provides the speed of processor based cryptography while helping to keep sensitive keys private from applications and the operating system.

Emperor also offers a cryptographic acceleration feature, the Crypto Express5S, providing a state of the art tamper resistant cryptographic coprocessor for secure-key operations along with new hardware assists for fast data encryption. Emperor with Crypto Express5S offers asymmetric key support for constrained environments using hardware assisted Elliptic Curve Cryptography (ECC), providing algorithms with much shorter key lengths than RSA keys for similar cryptographic strength— making ECC cryptography ideal for mobile and smartcards where performance constraints may be a consideration.

Emperor is a highly securable commercial server, built using groundbreaking technology you can trust. Without risk you can run many Linux virtual servers concurrently, leveraging Emperor's ability to isolate and protect each Linux virtual server, as if they were running on physically separated servers.

Enterprise qualities of service

Emperor enables enterprise grade Linux, one that is more robust and trusted for critical workloads, provides high performance and throughput to deliver a lower cost per transaction. Resiliency analytics for LinuxONE is designed to offer near real time diagnostics to help identifying potential problems in the Linux environment. It is an analytics solution executed in firmware, which intelligently examines message logs for potential inconsistencies or anomalies. With this capability organizations can address IT problems quickly, minimize availability lapses and intervene in IT problems before they become severe.

The IBM GDPS® Virtual Appliance can deliver multiplatform resiliency capability for Emperor. The solution is targeted to clients, who run the z/VM® hypervisor and associated Linux guests, providing high availability and disaster recovery benefits in case of system, application, or network failure.

IBM Spectrum Scale™ for Emperor, based on IBM GPFS™ technology, is designed to provide high availability through advanced clustering technologies, dynamic file system management and data replication. Spectrum Scale can continue to provide data access even if the cluster experiences storage or node malfunctions. Its scalability and performance are designed to meet the needs of your most data intensive applications.

When your IT infrastructure needs to be expanded, the efficiency, flexibility and qualities of Emperor are best in class. Its design allows you to grow capacity inside the server—on the fly—without affecting the running environment. Emperor can support exponential growth with up to 141 cores and up to 85 logical partitions for secured workload isolation, and HiperSockets™ for high speed internal partition-to-partition communications. Scaling within a single server helps eliminate the need to constantly buy, configure, and manage new services to handle growth. Emperor also supports up to 10 TB of memory which can provide impressive response time for in-memory applications as well as provide support for richer transactional analytics.

IBM LinuxONE Emperor at a glance

IBM LinuxONE Emperor at a glance		
Emperor Models	Cores: Minimum* – Maximum	Memory: Minimum – Maximum
L30	1 – 30	64 GB – 2.5 TB†
L63	1 – 63	64 GB – 5.0 TB
L96	1 – 96	64 GB – 7.5 TB
LC9	1 – 129	64 GB – 10.0 TB
LE1	1 – 141	64 GB – 10.0 TB
Cryptography		
Crypto Express5S	2 - 16 features	
Disk Connectivity		
FICON Express16S / FICON Express8S	Maximum: 320 ports	
NIC – Connectivity		
OSA-Express5S	Maximum: 96 ports	
High Speed 'Virtual' LANS		
HiperSockets	Up to 32 connections	
Supported Linux distributors		
Red Hat	Red Hat Enterprise Linux (RHEL) 6, and 7	
SUSE	SUSE Linux Enterprise Server (SLES) 11 and 12	
Canonical	Ubuntu 16.04 LTS	

IBM LinuxONE Emperor at a glance		
Supported Hypervisors		
IBM z/VM	z/VM 6.3	
KVM	KVM 1.1 running on IBM LinuxONE with SUSE SLES SP1 guests	
IBM partitioning technology	Up to 80 LPARs for secure workload isolation	
Typical Physical Weight of Air Cooled Configuration‡	Minimum configuration weight of new build L30‡	Maximum configuration weight of new build LE1‡
With Internal Battery Feature (IBF)	L30 3333 lbs (1512 kg) With overhead cabling 3453 lbs (1566 kg)	LE1 5983 lbs (2714 kg) With overhead cabling 6103 lbs (2768 kg)
Without Internal Battery Feature (IBF)	L30 2886 lbs (1309 kg) With overhead cabling 3006 lbs (1364 kg)	LE1 5312 lbs (2410 kg) With overhead cabling 5432 lbs (2464 kg)
Product Dimensions (D x W x H) without overhead cabling	73.5 x 61.6 x 79.3 inches (186.7 x 156.5 x 201.3 cm)	
Product Dimensions (D x W x H) with overhead cabling	73.5 x 72.7 x 84.8 inches (186.7 x 184.7 x 215.3 cm)	
Airflow (Capacity of Exhaust)	6370 cubic meters / hour (3800 CFM)	

Why IBM?

IBM understands your goals to drive top line growth and to enhance customer experience and loyalty. We understand your desire to use smart, efficient and robust technology solutions to achieve this. IBM provides expertise in systems, software, services and financing, that can help you optimize your Linux environments for the constant flow of opportunities and challenges. Emperor helps you address the velocity of your business while helping to keep users and data secure and budgets in check.