The evolving landscape of SDN: from the Data Center to WAN to 'Things'

Welcome

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The evolving landscape of SDN: from the Data Center to WAN to 'Things'

Software Defined Data Center: developments and trends

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Software Defined Networking is not a lonely tower
Software Defined Environment is foundational to IT-as-a-service and hybrid cloud

Key design principles:

• Flexibility
• Automation
• Integrated processes
• Availability
• Open standards
The Software Defined Data Centre

High Level Baseline

The Promise
• Agility
• Automation
• High availability
• Speed of service delivery
• Reduced human error
• Mirrors the design principles of Cloud
• Helps ‘untangle’ Hybrid
• Fail fast and iterate
## Network Transformation to SDN – What does it mean?

<table>
<thead>
<tr>
<th>Traditional Infrastructure (Today)</th>
<th>SDN Virtualized Infrastructure (Tomorrow)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical</strong></td>
<td><strong>Virtual</strong></td>
</tr>
<tr>
<td><strong>Rigid</strong></td>
<td><strong>Programmable</strong></td>
</tr>
<tr>
<td><strong>Proprietary</strong></td>
<td><strong>Open</strong></td>
</tr>
<tr>
<td><strong>Manual</strong></td>
<td><strong>Automatic</strong></td>
</tr>
<tr>
<td><strong>Consumed as device</strong></td>
<td><strong>Consumed as-a-service</strong></td>
</tr>
<tr>
<td><strong>Custom appliance</strong></td>
<td><strong>COTS/Open Hardware</strong></td>
</tr>
<tr>
<td><strong>Separate Operation</strong></td>
<td><strong>Operated like compute/IT</strong></td>
</tr>
</tbody>
</table>

- Slow to deploy
- Inflexible
- Costly
- Single supplier with backup
- Slow technologies adoption

- Quick to configure and deploy
- Flexible/Agile
- Significant savings with new business models
- Multiple supplier
- Quick technologies adoption
IBM Consulting experience
What we see, hear, and do

- Technology and Operational change and the ‘non-negotiables’
- Adopters with breadth or constant change in applications
- Or discrete use cases
- Especially Hybrid consumers
- SDN is shifting, at a rapid pace
- Business case for SDDC versus SDWAN is one-sided
- The...
  - Insurer
  - Investment Bank
  - Pharmaceutical

Factors considered before deciding how, when and where to adopt SDN capabilities

- Business drivers
- Organizational readiness for adoption
- Application environment, hierarchy and requirements
- Plans to leverage a hybrid IT/cloud infrastructure
- Automation, orchestration and scripting capabilities
- Network, server, storage and security infrastructure architectures
- Readiness, stability, and resilience of the base network infrastructure
‘By 2018, 60% of Global Enterprises will consume WAN services leveraging SDWAN technologies... 
...with a 90% growth rate between 2015 – 2020’.

IBM’s pathways to SDx

SDE/SDx Strategy

- SDx/SDE education and workshops
- SDx Readiness Assessment
- SDx/Network Strategy and Planning
- Demos/POCs
- SDx reference architecture
- Detailed design

SDx Design

- Innovation and Integration labs in Nice and Dallas
- IBM Cloud Orchestrator Support
- Partnerships with VMware, Verizon, Juniper, Cisco, Brocade and other innovators
- IBM Cloud Services
- Deployment

SDx Integration

- IBM Cloud Services
- IBM Managed Services
- IBM Outsourcing Services
- IBM Managed Maintenance services

SDx Monitoring

- IBM Cloud Services
- IBM Managed Services
- IBM Outsourcing Services
- IBM Managed Maintenance services

SDx Deployment

Design

Build

Run
A few options to start your SDx journey

• An in-depth overview of SDN and benefits, and focus on highlighting a clients use case  
  Typically 0.5 - 1 day

• An SDN deep dive, reviewing technology choices and architectures, aligned to a clients use case  
  Typically 2 – 5 days

• Formal SDN Readiness Assessment engagement to plan SDN journey from as-is to future operating platform  
  20 to 120 days (size, complexity and deliverables determine scale)
IBM ’IP’ in the software defined arena
People, Process, Partnership and Technology

- Neutral Consulting
- Multi-Network Services
- SDN and Any Cloud Support
- Watson IoT & Edge Analytics
- Global & Local partnerships
Connecting our clients, today and tomorrow
Now a presentation from our Global Partner
MultiNetwork WAN Services

Fully managed connectivity platform for hybrid cloud
For global enterprises, the network challenge is significant and growing.
IBM’s game-changing approach can strongly benefit multinational companies

- Global agility
- Simplified management
- Better performance @ lower cost

- 30% more bandwidth
- 25% decrease in monthly costs
MultiNetwork WAN Services
Network-as-a-Service fully managed platform

Connecting globally is paramount. IBM helps improve that connection by offering an array of services that can be built to your organization’s specific needs. Utilizing internet and MPLS circuits we optimize the global WAN.

We provide greater capacity available on demand with no local limitations. As well as a simplified management system (multiple carriers, technologies and locations via a single global dashboard). And better price performance: 30% more bandwidth and 25% lower WAN costs.

More agility, resiliency and transparency at a reduced cost.
The Global Network Peering Platform (GNPP) is the backbone of our solution.
IBM MultiNetwork WAN improves agility and simplifies the management of global multi-provider networks

- Creates a single, secure, corporate VPN
- Enables rapid provisioning of additional bandwidth
- Integrates connectivity and management across providers, geographies and infrastructures
- Reduces requirements for MPLS in favor of lower cost Internet circuits
Clients have visibility and transparency into WAN performance using MWS Dashboard, an online monitoring and reporting portal.
Five service categories enable cost-effective, optimal WAN connectivity and performance at each site

<table>
<thead>
<tr>
<th></th>
<th>Service Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>99.995%-99.9%</td>
<td>Used for data center connectivity solutions and includes multiple MPLS and Internet VPN connections for the highest service levels</td>
</tr>
<tr>
<td>2</td>
<td>99.99%-99.5%</td>
<td>Used for headquarters connectivity solutions and includes multiple MPLS and Internet VPN connections for the highest service levels</td>
</tr>
<tr>
<td>3</td>
<td>99.6%-99%</td>
<td>Used for key sites, it removes single points of failure by providing multiple links and a separate hardware device for each link</td>
</tr>
<tr>
<td>4</td>
<td>99.2%-98.25%</td>
<td>Used for less critical sites, it offers limited redundancy by providing multiple links terminating on a single hardware device</td>
</tr>
<tr>
<td>5</td>
<td>98.25%-97.5%*</td>
<td>Used for least critical sites, it offers no redundancy, providing a single MPLS or Internet VPN link terminated on a single hardware device</td>
</tr>
</tbody>
</table>

* Excluding Internet services
IBM MultiNetwork WAN Services enable organizations to mitigate common network risks

- Undetected security threats and performance issues
- Escalating network cost and complexity
- Insufficient bandwidth leading to delays and dissatisfied users
- Lack of in-house knowledge and support resources
A major international airline reinvented its global network to improve reliability, cost and service to customers.

The bottom line: 30 percent higher consumable bandwidth at a significantly lower cost.
Could your organization benefit from IBM MultiNetwork WAN Services?

- Do you have a large international footprint and use multiple network providers for your different sites?
- Are rising network costs a concern?
- Do you struggle with poor performance from providers in some locations?
- Are network changes rolled out too slowly and costly?
- Are you planning to increase bandwidth to support new applications?
- Are you having to add capacity even though your backup capacity is going unused most of the time?
- Do your network personnel lack the knowledge to make operational decisions in the best interest of the business?
- Would you like to leverage innovative network features like WAN optimization and integrated switches more easily?
IBM brings a multi-provider environment for improved performance and cost: service delivery and contractual model
Why IBM?

- Provider and technology independence
- Unique business model
- Systems integration expertise
- Fully managed services
Connecting our clients, today and tomorrow
IBM Watson IoT Platform

Edge Analytics

Watson IoT

Greg Knowles
Program Director,
Watson IoT Analytics
April 2017
IoT Data Needs to be Connected to Derive Insight, Reduce Costs and Improve Productivity

Most IoT data are not used currently. For example, only 1 percent of data from an oil rig with 30,000 sensors is examined. The data that are used today are mostly for anomaly detection and control, not optimization and prediction, which provide the greatest value.

McKinsey & Company "The Internet of Things: Mapping the Value Beyond the Hype." June 2015
Challenges to unlocking insights from the remaining 99%

- Too much data to transmit to applications and analytics
- Highly distributed equipment & data collection across operations often resulting in data silos
- Mission critical operations requiring local decision-making and low latency
- Optimizing IoT connectivity and available bandwidth
- Inability to leverage the flexibility and scalability of the cloud
What is Edge Analytics?

**Definition**
Edge Analytics enables delivery of analytics to the edge of the network to process, analyze, and respond to data where it makes the most sense while enabling data to be delivered centrally for deeper analytics.
## Where can Edge Analytics help?

### Autonomous Operations
- **Industries:** Automotive, Oil & Gas, Manufacturing, Heavy Equipment
- **Examples:** Discrete manufacturing & continuous operations
- **Potential:** Economic impact of $1.2 trillion to $3.7 trillion per year in 2025 *(McKinsey)*
- **Benefits**
  - 10 – 20% reduction in health & safety costs
  - 5 – 10% increase in worksite productivity
  - 5 – 10% reduce costs of equipment

### Remote Operations
- **Industries:** Transportation, Oil & Gas, Utilities, Mining, Construction
- **Examples:** Shipping, Drilling, pipelines, oil platforms, wind/solar farms
- **Potential:** Direct economic impact of $160 billion to $930 billion per year in 2025 *(McKinsey)*
- **Benefits**
  - 10 – 20% increase in productivity
  - 5 – 12.5% decrease in operation costs
  - 10 – 40% cost savings for equipment & maintenance

### Large Scale Operations & Fleets
- **Industries:** Commercial Real Estate, Travel & Transportation, A&D, Heavy Equipment, Electronics
- **Examples:** Elevators, motors, aircraft & engines, buildings & systems, commercial equipment
- **Potential:** Economic impact of $560 billion to $850 billion per year by 2025 *(McKinsey)*
- **Benefits**
  - 10 – 20% increase in personnel productivity
  - 5 – 12.5% decrease in logistics & scheduling costs
  - 10 – 40% cost savings for equipment & maintenance
Enabling Use Cases from Edge to Cloud

**Condition Based Maintenance**
Uses sensor data from equipment and applies a monitoring strategy that uses the actual condition to determine maintenance.
- Reduces failures
- Reduces cost of maintenance
- Greater asset availability

**Predictive Maintenance**
Applies a deeper analysis of historical data to build predictive models for asset health and failures.
- Forewarns of potential failures
- Reduces failures
- Real-time predictions

**Predictive Quality**
Works holistically across equipment and work cells to understand the predictors of poor quality across a process.
- Ensures future equipment quality
- Generates statistical quality models
- Uses environment / weather data
Edge & Cloud Application Journey

**Phase 1 (Immediate)**
- Connectivity
- Data Collection
- Analysis of data at the Edge and Fog
- Visualization

**Phase 2 (3-6 months)**
- Connectivity into business systems
- Data enrichment through analytics
- Multi-site analysis across the Enterprise (Cloud)
- Inventory across the Enterprise

**Phase 3 (12 months)**
- Predictive Maintenance
- Predictive Quality
- Machine Learning
- Add external data sources (i.e. weather, social media, energy costs)
- Intelligent Supply Chain & Inventory

Data Growth, Insight, & Value
Edge Analytics reduce data feeds, make local decisions, and can run disconnected.
Edge Analytics reduce data feeds, make local decisions, and can run disconnected.

Certified GW partners:
- Cisco – 809/829, IE4000, UCS
- ADLink
- Dell 3000/5000
- Intel reference GWs
- Also Telit DeviceWise

Edge Analytics SDK Community:
https://developer.ibm.com/iotplatform (under ‘Resources’)

Edge recipes
Global Auto Manufacturer benefits from edge-based Condition Monitoring & Predictive Maintenance

Challenges
- Ensure high quality welds made by robots during manufacturing, improve detection speed to reduce impact of down process activities
- Monitor robot health through predictive modeling to detect early signs of deteriorating performance and risk of failure

Solution
- Edge analytics for real-time monitoring of welding robots based on properties such as vibration, rotation speed, velocity and weld temperature
- Cloud-based cognitive analytics for forecasting asset health and predicting component failures
- Components: IBM Predictive Maintenance & Quality, IBM Watson IoT Platform & Edge Analytics, Cisco Edge Analytics Fabric

Outcomes
- Higher quality welds with reduced rework, overtime, and scrap improving output and decreasing overall costs
- Predictability of robot issues allowing for pro-active maintenance during operational down time
Port of Cartagena leverages Condition Based Maintenance

**Challenges**
- Fleet of hundreds of vehicles, cranes and boats operating 24x7x365. Struggling to maintain equipment efficiently.
- Can’t afford to rely exclusive on cloud analytics due to potential connectivity problems.

**Solution**
- Consists of: Cisco UCS240 Server, Cisco Edge Analytics Fabric, Watson IoT Platform with Edge Analytics.
- Optimizing maintenance by triggering automatic alerts based on conditions at the edge (fuel levels, battery voltage, engine conditions and other advanced measures).

**Outcomes**
- Now conducting condition-based maintenance, informed by actual condition of assets operating at the edge.
- Critical data analyzed immediately at the edge; high-value data sent data for deeper analysis in the cloud.
SilverHook Powerboats uses sensor data collected from racing boats to improve real-time decision-making and safety of racers and to enhance the fan experience.

Using IBM Watson IoT Platform Edge Analytics, SilverHook responds to emerging conditions that affect engine performance. Local analytics run directly on the boat to detect when engine conditions can lead to a problem and notify the boat driver through the local communication channel to take corrective action in real-time. The edge agent also forwards race data to the cloud for the fan dashboard and for later analysis.

On IBM® Bluemix™, SilverHook was able to quickly build an application to analyze and deliver insights in a useful format to racers and fans. The team completed a prototype in 40 percent less time, delivering a comprehensive analytics solution with data visualization in just three months.
IBM Watson IoT Platform

Everything you need to transform with the Internet of Things

✓ Connect and manage sensors, devices, and gateways while ensuring trusted sources, reliable data, and secure access

✓ Enrich data for greater insight with structured and unstructured sources and third party data such as weather, asset master data, and social data

✓ Gain insight and take automated action leveraging a rich set of analytics from real-time and machine learning to predictive and cognitive

✓ This is a journey, but getting started is easy!

IBM’s point of view on the Internet of Things

Explore IBM Watson IoT

Join us in our IoT conversations @IBMloT
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