

# Connecting Cloud Services & Agency Infrastructure

ITS CANADA 2018 – Niagara Falls – June 20<sup>th</sup>



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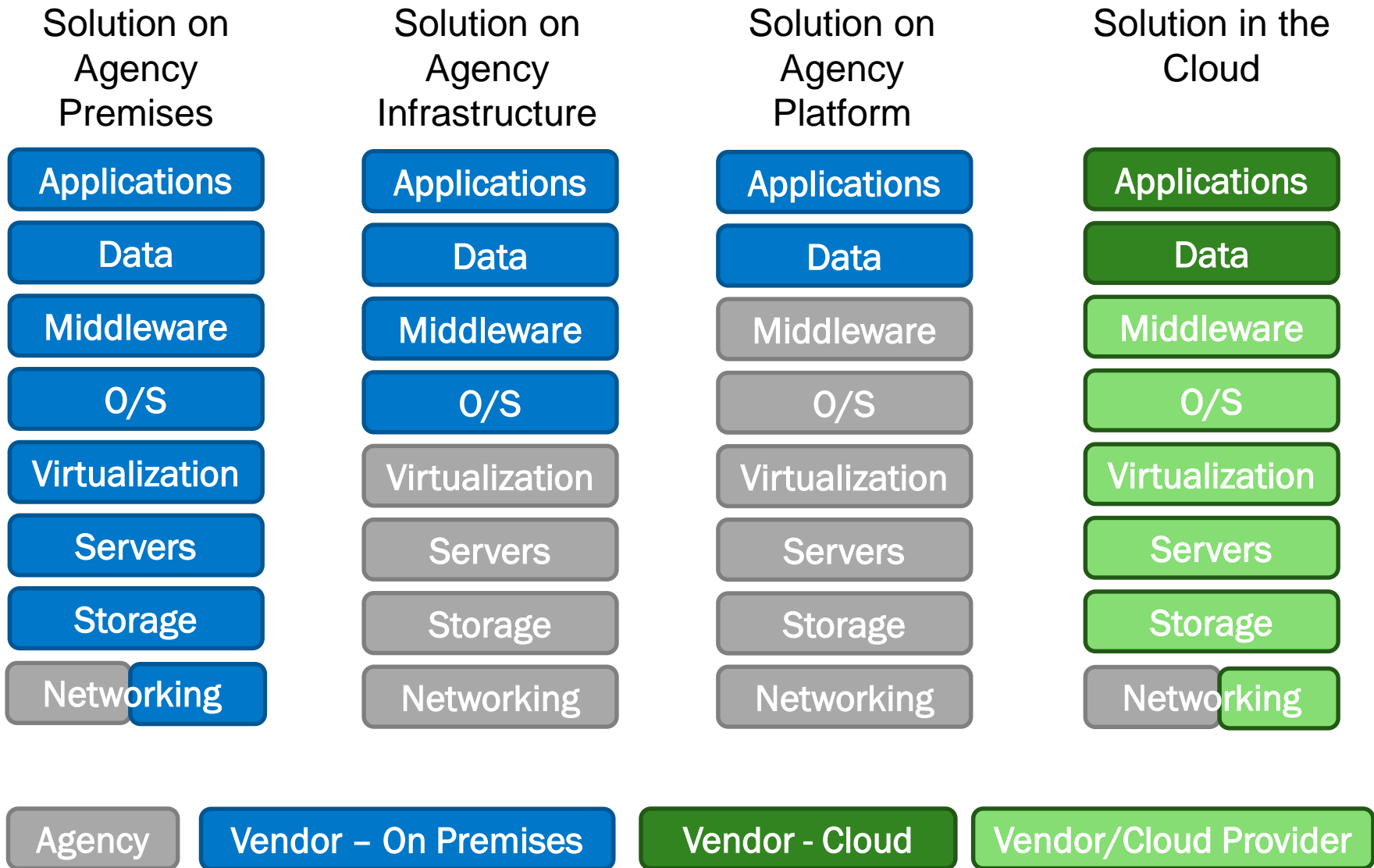
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# Agenda

- ITS Deployment Options
- Why the Cloud for ITS?
- Agency Connections & Concerns
- Cloud Options & Challenges
- ITS in the Cloud - Example
- Lessons Learned



# ITS Deployment Options



# ITS Deployment Options – Solution on Agency Premises

Solution on Agency Premises

Applications

Data

Middleware

O/S

Virtualization

Servers

Storage

Networking

- Turnkey solution
- Vendor provides
  - Solution (Apps, DB, OS, etc.) installed on supplied Servers
  - Solution management & support (backups, patching, etc.)
  - Server support
  - Networking for servers & supplied ITS devices
- Agency provides
  - Networking to ITS devices and workstations
  - Remote access for solution support (maybe)

Agency

Vendor – On Premises

Vendor - Cloud

Vendor/Cloud Provider



# ITS Deployment Options – Solution on Agency Infrastructure

Solution on  
Agency  
Infrastructure

Applications

Data

Middleware

O/S

Virtualization

Servers

Storage

Networking

- Vendor provides
  - Solution (Apps, DB, OS, etc.) installed on Infrastructure
  - Solution management & support (backups, patching, etc.)
- Agency provides
  - Server Infrastructure (Virtualization and/or Servers)
  - Monitoring Infrastructure (VM Resources)
  - Infrastructure support
  - Remote access for solution support

Agency

Vendor – On Premises

Vendor - Cloud

Vendor/Cloud Provider



# ITS Deployment Options – Solution on Agency Platform

Solution on  
Agency  
Platform

Applications

Data

Middleware

O/S

Virtualization

Servers

Storage

Networking

- Vendor provides
  - Solution Application installed on Platform
  - Solution Application support
- Agency provides
  - Platform (VM, OS, DB) to vendor requirement
  - Virtual Servers Infrastructure
  - Platform Management (backups, patching, etc.)
  - Infrastructure support
  - Remote access for application support

Agency

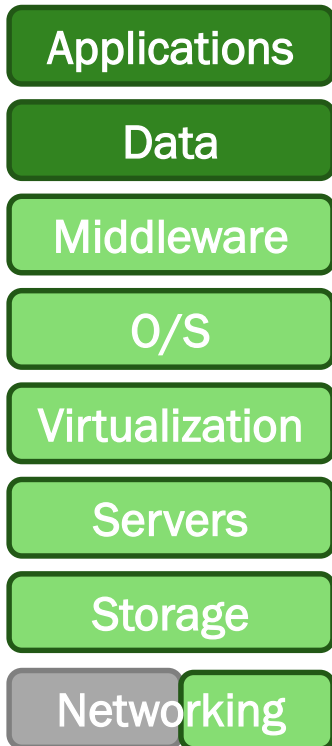
Vendor – On Premises

Vendor - Cloud

Vendor/Cloud Provider

# ITS Deployment Options – Solution in the Cloud

Solution in the Cloud



- ITS in the Cloud
- Vendor provides
  - Solution installed in the Cloud Platform
  - Solution management and support (backups, patching, etc.)
  - Cloud Platform Provider (e.g. AWS, MS Azure, Google, Others)
- Agency provides
  - Network access to Solution from agency workstations
  - Network access to agency devices

Agency

Vendor – On Premises

Vendor - Cloud

Vendor/Cloud Provider



# Why the Cloud for ITS?

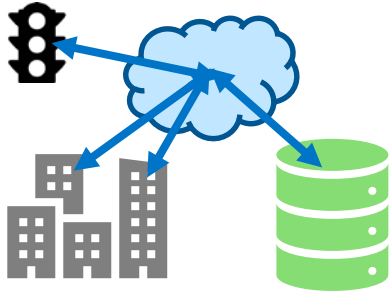
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- Cloud Infrastructure Benefits
  - Scale to Fit the use
  - Pay for what you use
  - Deployment design – only pay for a fraction of this cost
- Fully managed solution - Agency IT admin resources are minimized
- Low capital cost of entry – monthly operational costs (variable!)
- High availability – Many redundancy options available
- Quick deployment – Servers can be spun up in minutes
- Quick and easy to scale/upgrade – Small increase in monthly costs
- Security – Many security options available!





# ITS in the Cloud – Agency Connection



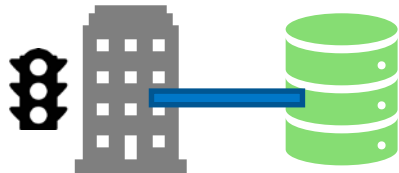
- Public Facing

- Use the public internet to access the Solution
- Higher security risk – need security solutions – multifactor authentication, client VPNs WAFs, continuous security scanning (IDS)
- Wide user base, multiple device entry points



- Private VPN Connection

- Use the public Internet and VPN (IPsec) to extend the agency network to access the Solution
- Extend agency security & management policies to Solution



- Direct Connect

- Direct physical connection (e.g. fiber) to Cloud service provider to access the Solution
- More secure than public internet connections
- More involved & costly to setup & operate
- Ultra low latency and predictable network performance

# ITS in the Cloud - Agency Concerns – SECURITY!!!

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- Solution to provide **secure** integration with agency's enterprise network
- Agency workstation access to the Solution must be **secure**
- Solution access to agency devices must be **secure.**
- Vendor Access to the Solution must be **secure**
- Solution should have minimal or no personal Identifiable Information (PII)
- Solution should have minimal or no confidential information (CI)
- **Secure** storage of data (in political jurisdiction)



# ITS in the Cloud – Cloud Options

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- High Reliability – More reliability more \$\$\$\$
  - Multiple Cloud Providers
  - Hybrid Cloud (Cloud/On Premise)
  - Cloud Provider with Multiple Regions
  - Cloud Provider in Single Region, Multiple Availability Zones
  - Cloud Server
- Managed Services – Many services all at \$
  - Platform security management
  - Platform patch management
  - Platform monitoring and remediation based on SLA's
- Scalability & Flexibility - \$\$ per use
  - Scale to fit agency needs (e.g. Seasonal variation – winter control)
- Advanced Features – Cool tools for \$\$\$
  - Data Analytics & Prediction



# ITS in the Cloud – Cloud Challenges

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- Security – Cloud has unique challenges that need to be addressed
  - Cloud security must be configured and properly validated regularly
  - Regular scans and audit are recommended to ensure compliance.



- Networking – Need rigorous design
  - Bandwidth costs, so communication assessment is important
  - Cloud vendor outages can occur, needs to be understood
  - Communication issues are a shared responsibility for diagnostics



- Cloud Provider - Specific Services
  - Careful consideration must be paid to services provided by cloud vendors.
  - Cloud services interfaces may change, and costs can be variable.

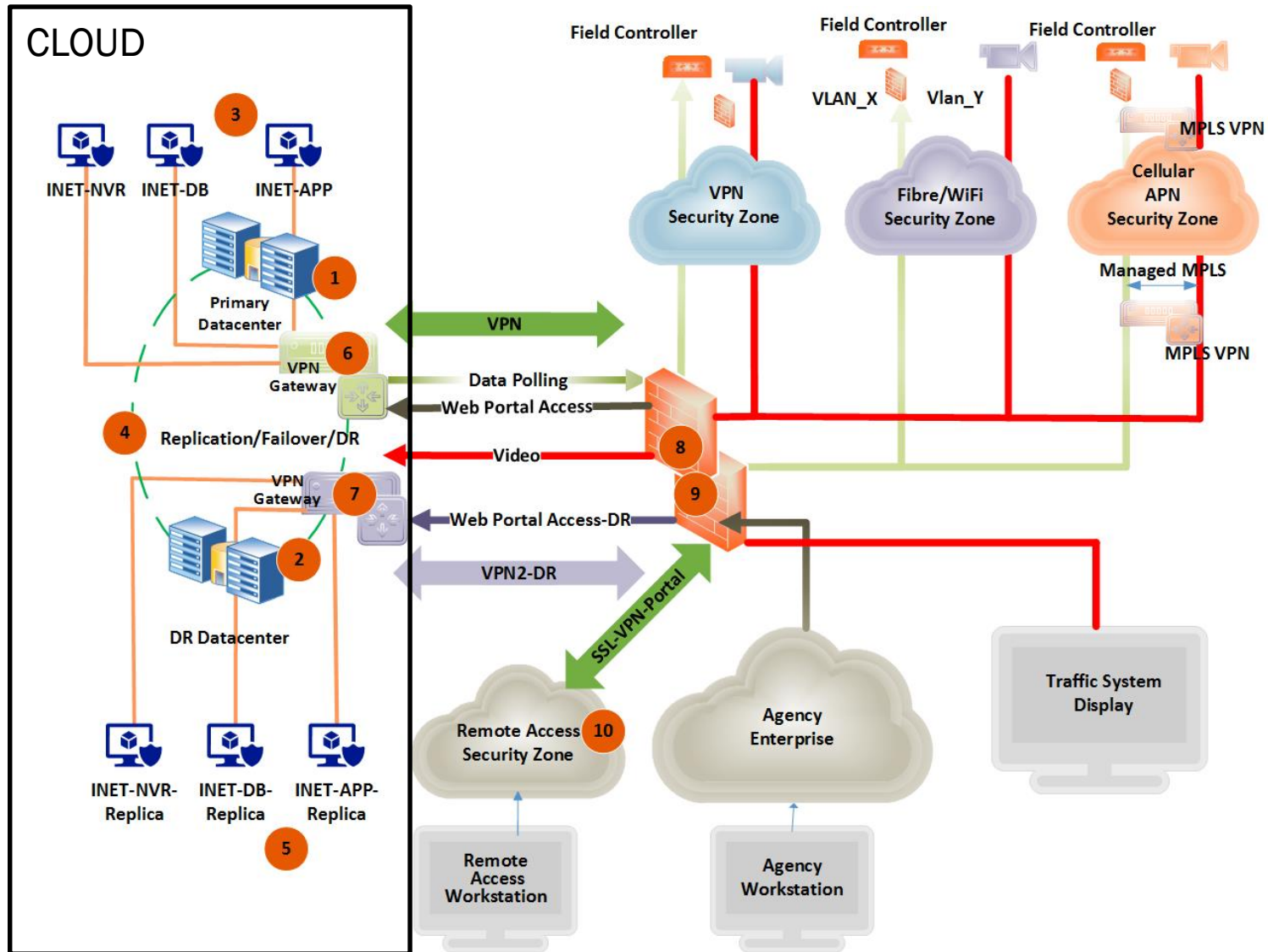
# ITS in the Cloud - Cloud Costs

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- Clouds Costs (Monthly) – Variable – Difficult to accurately estimate.
  - Compute – CPU cost per hour
  - Storage - per GB plus transaction cost
  - Network Bandwidth – per Gbit cost
  - Security and Monitoring services - per use cost
  - Dashboards and Reporting – per user cost
- Cloud services are fit to use, but are variable.
- Discounts are available for reserved resources
- Proper Planning is critical to ensure optimal costing
  - Don't pay for more than you need.
  - Get an accurate utilization estimate for monthly cost estimate.



# ITS in the Cloud - Sample Architecture – Private VPN



# ITS in the Cloud – Lessons Learned

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- Early Agency IT Stakeholder involvement – Identify staff concerns
  - Security staff, Networking staff, Wireless staff, Field Comm staff
  - Knowledge exchange between agency & vendor
- Reviews between Vendor & Agency IT staff
  - Establish information agency needs , e.g. endpoint configurations, IPsec, TLS etc.
  - Establish solution networking needs, e.g. ports & protocols & purpose, certs
  - Establish network demarcations and IT staff responsibility
  - Test and verify connections jointly
- Cloud costing must be carefully managed
  - Simple ITS Solution - Easy to manage and cost
  - Advanced ITS Solutions with Video, Data Analytics, IoT, etc.
    - Requires design and prototyping to determine monthly costs – variable

# Connecting Cloud Services and Agency Infrastructure

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