U.S. Department of State

IT Consolidation Executive Forum
October 19, 2010

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Agenda

- **Department of State Challenge**
- **Keys to Success**
- **Consolidation**
- **Long Range Plan**

Department of State Challenge

The Department of State Data Center infrastructure was old and running out of power, space and cooling.

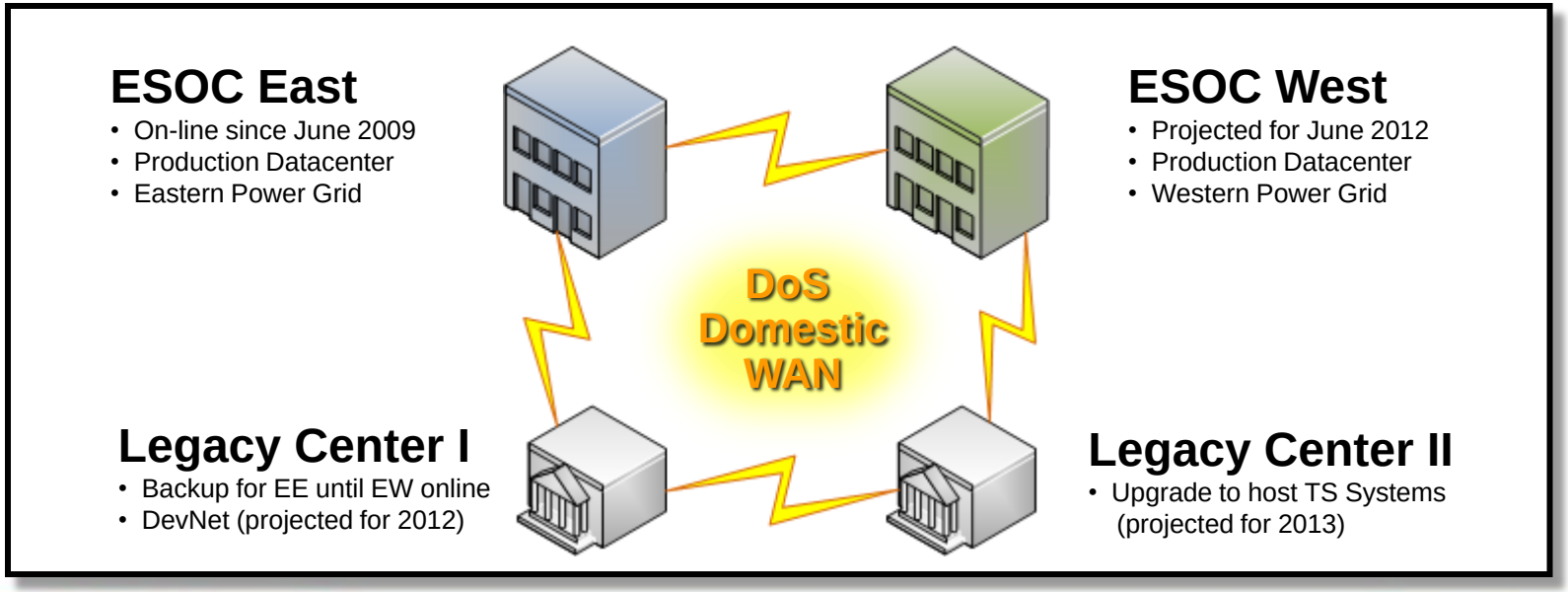
Key Success Strategy

- **Leadership Support**

Leadership -- Business Case Analysis

Why consolidate?

- Give back valuable DC office space to the Department
- Save Money
- Consolidate all data centers, servers, and enterprise services
- Maximize use of virtualization
- Maximize energy and resource efficiency
- Improve Uptime for all Enclaves – intranet, classnet, and devLAN



Key Success Strategy

- **Funding**

Funding Strategy

Strategy

- Centrally Funded by Department Up Front
- Charge Back Model Under Development for FY14

Key Success Strategy

- **Building the Right Team**

The Right Team

- Separate Design Build Lead
- Separate Operations Lead
- Experienced Project Managers
- Cohesive Team

Key Success Strategy

- **Communicating the Vision**

Communicating the Vision (Target Centers)

ESOC East (fully operational)

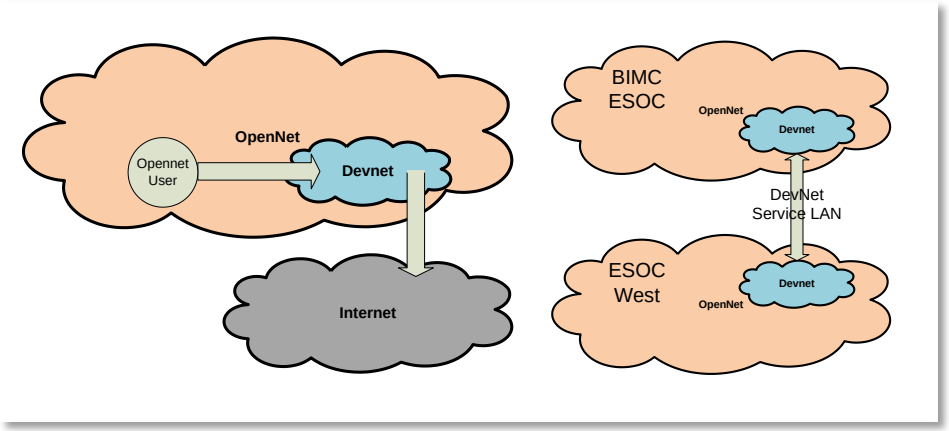
- Operational Jul 2009
- Govt Leased Commercial Facility
- Eastern power grid (Outside DC Blast Zone)
- Tier 3 Data Center - 100% Power SLA
- OpenNet and ClassNet, including data replication (ServiceLan)
- *Customer* Lights-out facility
  - 24x7x365 Onsite ESOC staff
  - 24x7x365 DS guard presence

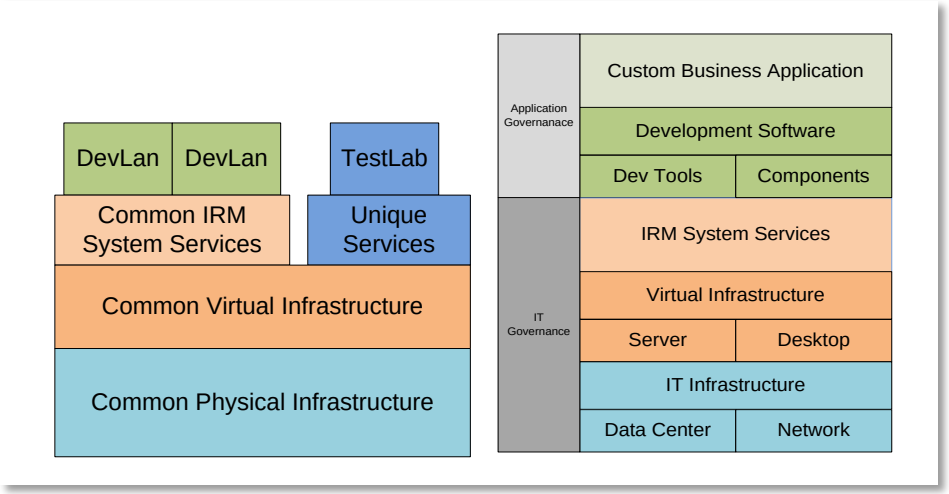
ESOC West (under construction)

- Planned for operation in Summer 2012
- Federal Government campus
- Western power grid – Pod Design
- Tier 3 Data Center – 100% Power SLA
- OpenNet and ClassNet, including data replication (ServiceLan)
- *Customer* Lights-out facility
  - 24x7x365 Onsite ESOC staff
  - 24x7x365 DS guard presence

Vision -- Development Data Center (FY12)

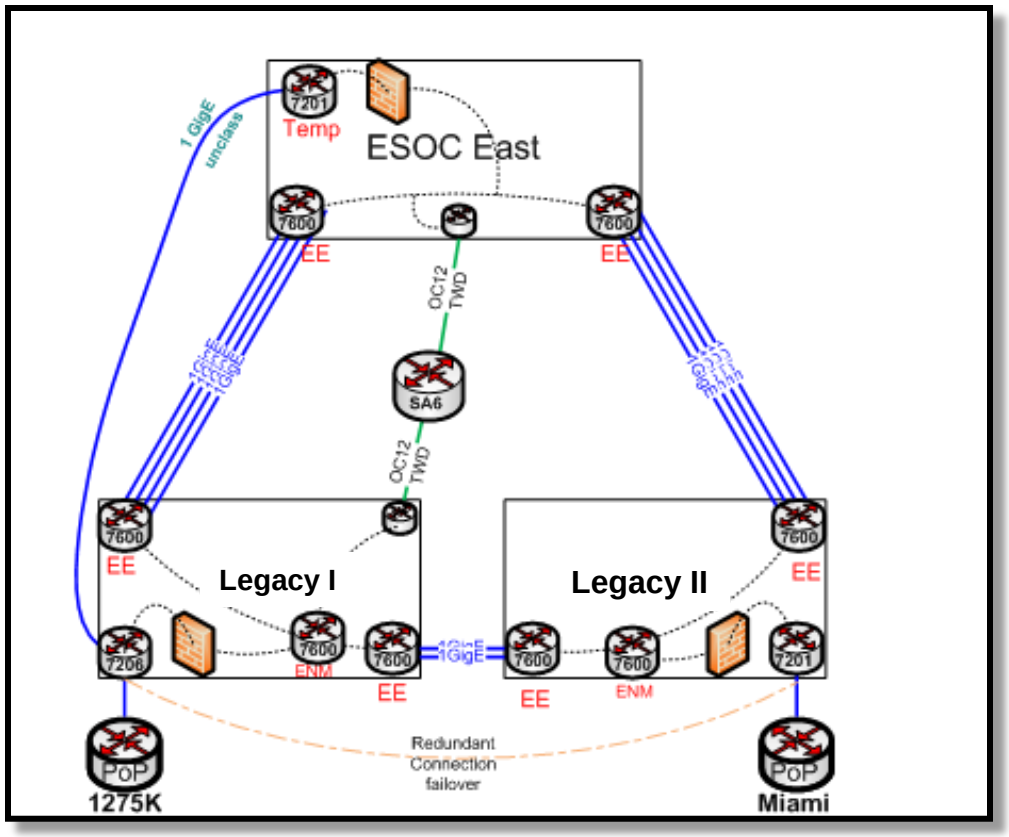
- **Development Network**
  - Multi-tenant dev environment accessible from OpenNet
  - Supports integration of existing customer dev LANS
  - Tiered managed services support for customers (Co-located, Co-managed, Hosted, Managed)
  - DevNet Virtual environment allows for testing of EE production environment
  - Planned backup capability at EW
- **Test Labs**
  - Enables migration of existing customer test labs (Co-located support only)
  - Authentication and remote access defined by customer
- **Governance**





Vision (Network Connectivity)

- **Existing high-speed backbone connectivity (using different carriers)**
  - Legacy I → EE = 5 Gig
  - Legacy II → EE = 4 Gig
  - Legacy I → BIMC = 2 Gig
  - Legacy II → HST/EE = OC12
- **Installing Riverbed**
- **Anticipated**
  - Upgrade to 10Gig for EE, EW, HST, BIMC connections
  - DMZ Migration to EE
  - ESOC West will start with 10G and DMZ

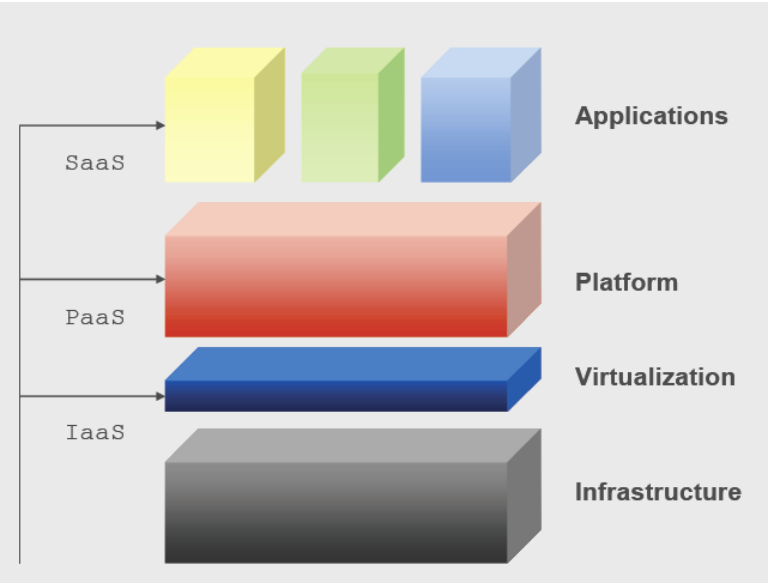


Vision – Consolidation Service Model Architecture

Software as a Service (SaaS)
Use provider's applications over a network

Platform as a Service (PaaS)
Deploy customer-created applications to a cloud

Infrastructure as a Service (IaaS)
Rent processing, storage, network capacity, and other fundamental computing resources



ASP

- CRM
- Email
- Collaboration

Web Hosting

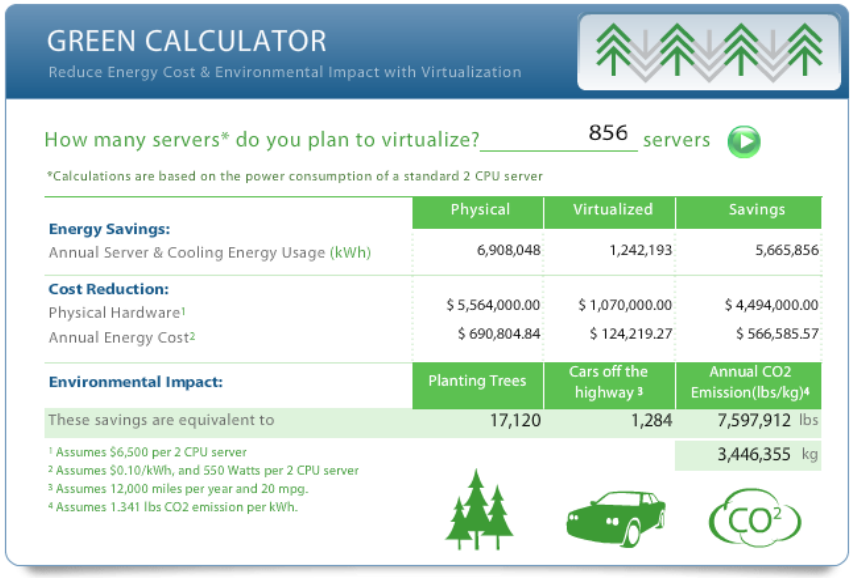
- Web Dev
- Data Base
- Collab APIs

Co-location

- Virtualization
- Hardware
- Data Center

Virtualization Model

- **All systems will be assessed for virtualization**
  - Supported by the ARRA STP Team
  - Estimated Real Dollar Savings is $5.6 million/year
- **Applicable candidates will use the ESOC's Virtual Infrastructure (VI)**
- **ESOC VI** (Virtual Infrastructure):
  - VMWare ESXi
  - HP Blades
  - NetApp storage
- **Virtualization is at 42 Percent at ESOC East**



GREEN CALCULATOR

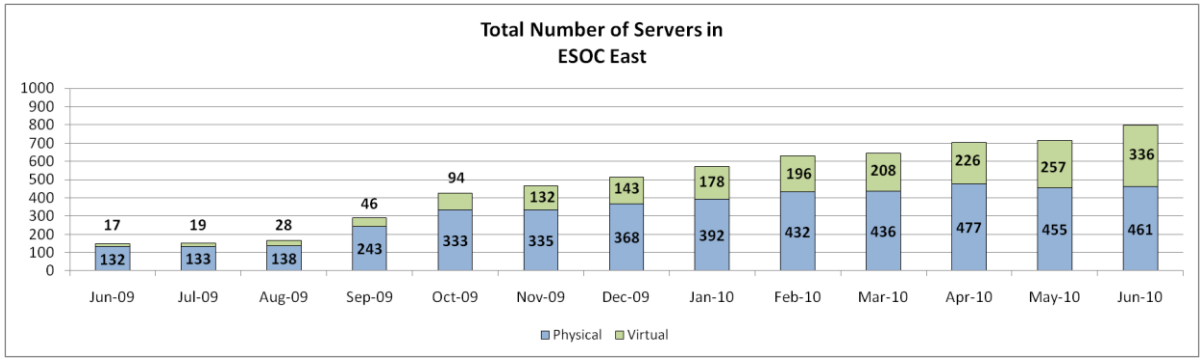
Reduce Energy Cost & Environmental Impact with Virtualization

How many servers* do you plan to virtualize? 856 servers

*Calculations are based on the power consumption of a standard 2 CPU server

	Physical	Virtualized	Savings
Energy Savings:			
Annual Server & Cooling Energy Usage (kWh)	6,908,048	1,242,193	5,665,856
Cost Reduction:			
Physical Hardware[1]	$ 5,564,000.00	$ 1,070,000.00	$ 4,494,000.00
Annual Energy Cost[2]	$ 690,804.84	$ 124,219.27	$ 566,585.57
Environmental Impact:	Planting Trees	Cars off the highway [3]	Annual CO2 Emission(lbs/kg)[4]
These savings are equivalent to	17,120	1,284	7,597,912 lbs
			3,446,355 kg

[1] Assumes $6,500 per 2 CPU server
[2] Assumes $0.10/kWh, and 550 Watts per 2 CPU server
[3] Assumes 12,000 miles per year and 20 mpg.
[4] Assumes 1.341 lbs CO2 emission per kWh.



Key Stakeholder Virtualization Buy-In

Evils

- Performance
  - CPU (<10%)
  - Disk (<20%)
- Life Cycle Timing

DoS Guarantee

If we recommend virtualization and it fails, we will supply the real machine.

Benefits

- Centrally funded servers
- Reduced acquisition time and process
- Offsite Server and Data Backup
- High Availability Servers
- Hardware upgrades easier
- Monitoring and Notification on outages
- No loss of admin privileges on system
- ESOC Support in the migration

Key Success Strategy

- **Key Stakeholder Buy-In**

Key Stakeholders (Who are They)

Data Center Service Providers

Data Center

- Contract for new data center facilities
- Manage Data Centers
- Aid providers and application owners in planning transitions
- Provide ongoing support at data center
- Aid customers in executing transitions
- Ongoing 24x7x365 onsite support

Vendor (If Leased)

- Provide facility and infrastructure services per the contract

Shared Infrastructure Service Providers

Other IT Stakeholders

- Establish and support network
- AD/DNS/SMS, etc
- Firewalls/PKI/DMZ's
- IT Consolidation In-Scope Servers

Security

- Audit and provide physical security
- Information Assurance
- Audit and certify technical security of transitioned applications

Facilities Management

- Decommission and demolish emptied data center facilities

Customers to be Consolidated

Application Owners

- Move and validate applications/systems

Infrastructure Owners

- Support applications and move necessary infrastructure
- Decommission existing and plan transitions

Data Center Owners

- Develop strategy to transition equipment, staff, customer contacts

Key Success Strategy

- **Project Management**

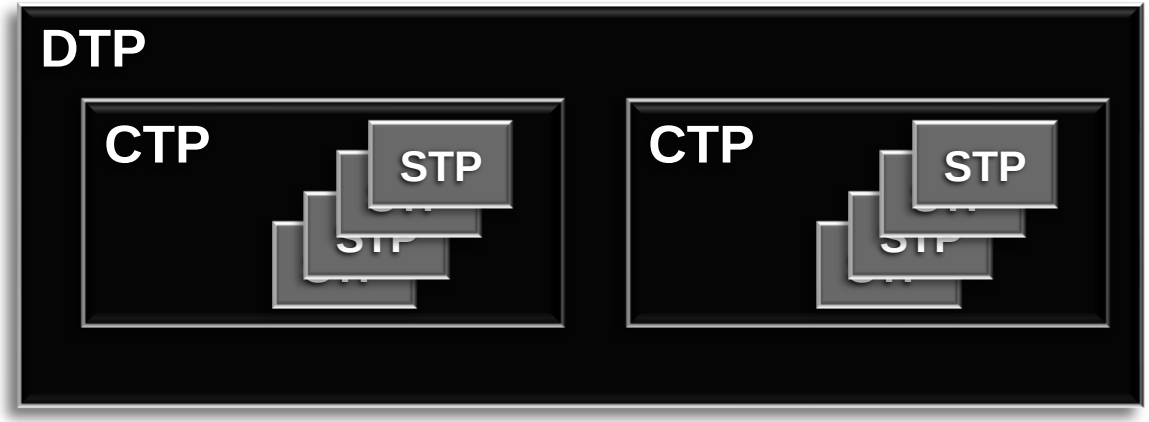
Project Management (Approach)

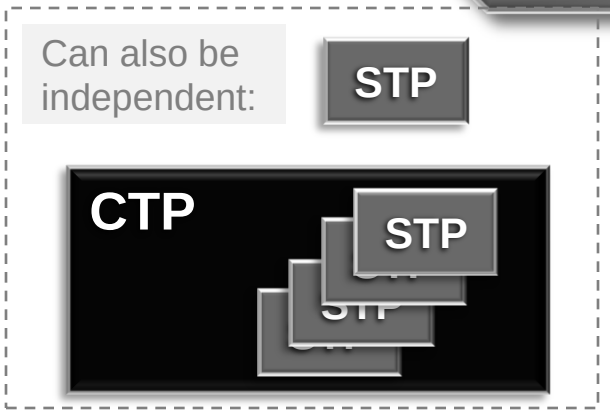
- **Definitions:**
  - **Datacenter Transition Plan (DTP) –** overarching project to migrate all systems out of a designated datacenter
  - **Customer Transition Plan (CTP) –** project to analyze, plan, and oversee execution migrations of a specified set of systems for a particular customer
  - **System Transition Plan (STP) –** project to plan, execute, and evaluate a system's transition to a new data center

STRATEGIC

STRATEGIC

TACTICAL





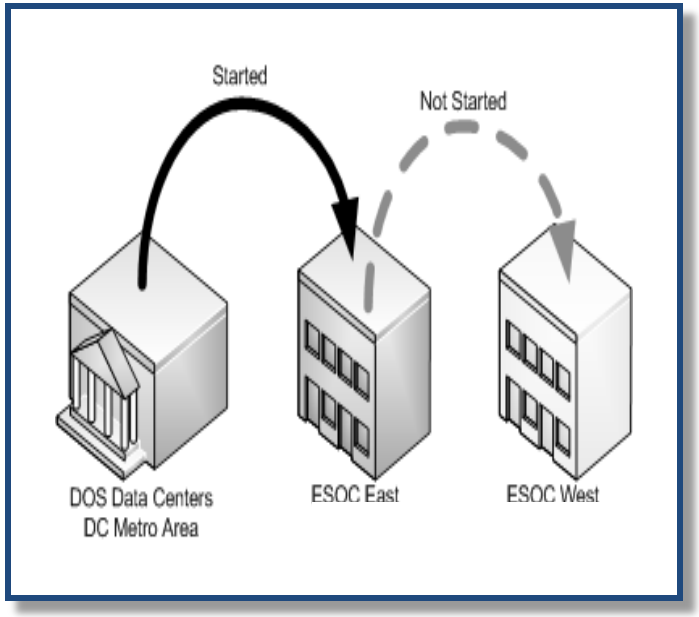
Key Success Strategy

- **Consolidation**

Consolidation (Scope)

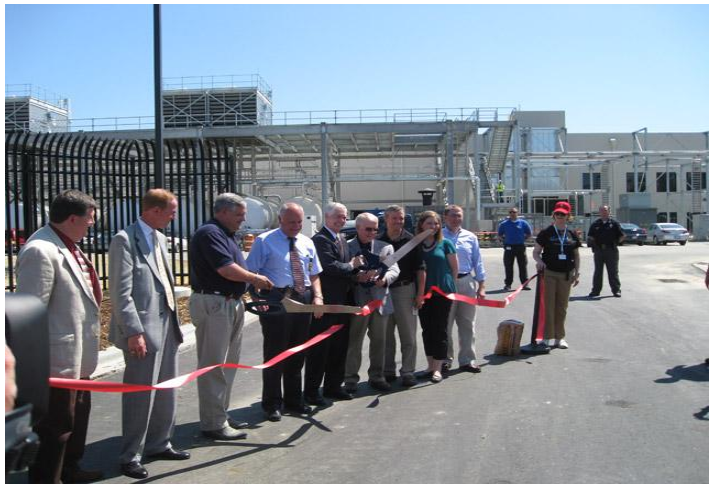
- **Consolidation of Bureau Systems and Applications into ESOC**
  - Infrastructure services provided by ESOC (VM, storage, backups, monitoring, etc.)
  - Applications remain under customer management

- **Out-of-Scope Server Migration**
  - Bureau app, database, and web servers
  - System ownership retained by Bureau



Consolidation Milestones -- ESOC East FY09

- **Aug 2008 - Jan 2009 - Established services contract with Commercial Vendor**
  - Commercial Vendor - Top-tier Commercial Data Center Colocation service provider
  - Outside the blast zone on the outskirts of the DC metro region
  - 11,000 sq ft dedicated to Department of State
  - Scalable to 2,500 servers
  - 100% availability SLA for power and environmentals
  - 10 year contract (1 base year, 9 option years)
- **April 2009 – Completed customized build of secure facility**
- **May 2009 - Established ESOC East IT infrastructure**
  - Core communications and management infrastructure
  - Virtual infrastructure servers, SAN, and backup components
  - Rack infrastructure to support initial 500 customer servers
  - OC12 connections to Legacy I and II
- **May 2009 - Production for customers**
- **October 2009 - Ribbon cutting**



Consolidation Milestones -- ESOC East FY10

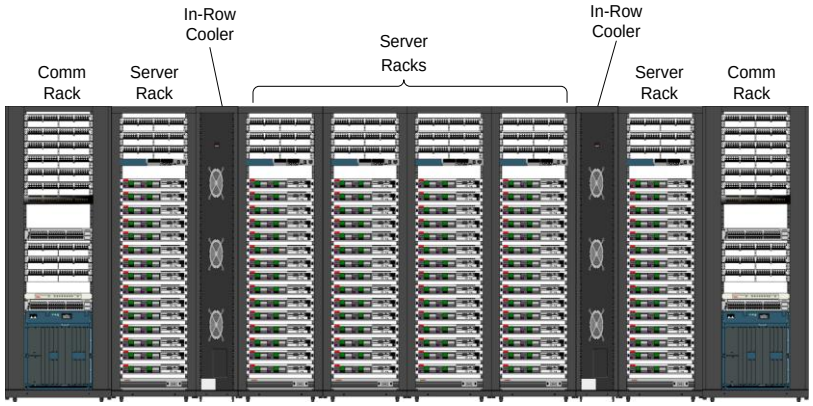
- **Transitioned 797 servers into ESOC East**
  - 461 physical servers
  - 336 virtual servers (42% Virtual)
- **Expanded Utilization, Racks, Network**
  - Upgraded Virtual Infrastructure to Blade Solution
  - Moved from OC12 to Multiple GIGe Circuits
  - Added 75 racks bringing count to 129
- **Installed and tested DMZ to replace HST 1720 DMZ**
  - Migration planning in process
  - Migration will be completed by end of FY11

Consolidation -- ESOC East Facility Overview

Rack/Row Infrastructure

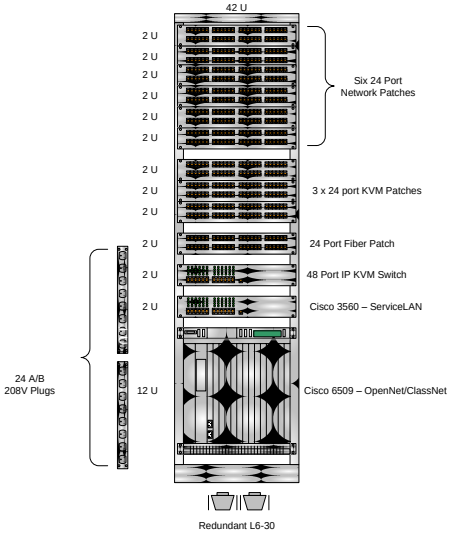
- Rack infrastructure designed to provide complete redundancy for power and network
- All network cabling is overhead. All power is underground or within rack
- Vendor provides rack, power, patched network connectivity for comm. & server racks
- ESOC/Customer provide data racks and network. Vendor provides power

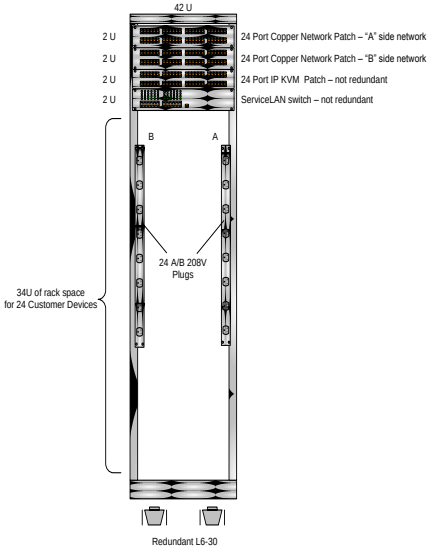
Typical Row



Row-Level Comm Rack

- 6 copper patches, 1 per server rack in the row
- A/B side power
  - 30 Amps
  - 24 x 208V outlets
- Robust fiber switch back to network core
- IP KVM fibers over OpenNet
- ServiceLAN fibers back to core

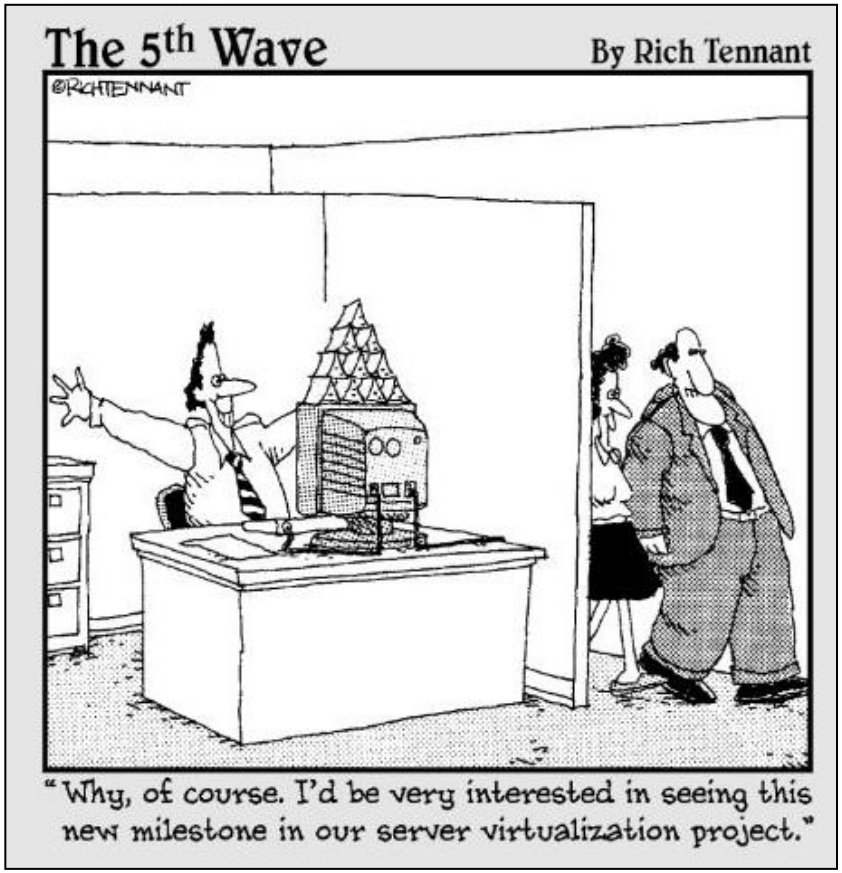




Server Rack

- 34 U space for 24 Customer devices
- A/B side power
  - 30A std
  - 20-80A available
  - 24x 208V outlets
- A/B side copper patches
- Non redundant IP KVM
- Non redundant ServiceLAN
- Fiber as needed for SAN

Results



2009	2010
62 DL 380	Added 196 High Capacity Blades
2283 Total 1866 Real 417 VM's	3276 Total 2420 Real 856 VM's
Adding 10 per month	Adding 40 per month
Average 10 VM's per server	Average 25 VM's per server
10 Enclaves	14 Enclaves

Long-range Plan

- **Lines 1 through 4 are target end-state data centers**
- **Line 5 are domestic data centers to be decommissioned**
- **Line 6 is the OCONUS Virtualization Rollout**
- **Line 7 is the CONUS site plan**

Facility	FY10	FY11	FY12	FY13	FY14	FY15	FY16
ESOC East (EE)	500 Systems DMZ/FW/PKI	500 Systems	500 Systems	500 Systems	40 Gb Core Upgrade	Refresh VI	
ESOC West (EW)	Design & Building Construction		Core Install Completed 500 Systems	1000 Systems	1000 Systems 40 Gb Core Upgrade		Refresh VI
		DMZ/FW/PKI Implemented		Contruction of 2nd Pod			
Legacy I	Planning Complete DevLan Alpha Test	DevLan Beta Test	DevLan in Production BIMC Reprovisioned				
Legacy II		Design	Construction to Support TS				
				TS Support Online			
Oconus		Virtualize 92 Posts	Virtualize 46 Posts	Virtualize 55 Posts	Virtualize 90 Posts		
Bureau-Specific Conus Sites			Develop Design / Plan		Consolidate Infrastructure		

It ain't easy being Green

ESOC Green Initiatives

- **Virtualization**
- **Heat Control**
  - Hot/Cold Isle
  - Air Cooled
  - Run Hotter
- **Power Control**
  - Smarter Servers
  - Consolidate Servers

Questions ???