

Quarterly Network Forum



March 5, 2013



Agenda

9:30am – 9:35am Opening and Introduction

Neeraj Chauhan, Network Branch Chief, STND Division

9:36am – 9:50am Update on Projects and Major Efforts

Gregory Parks, Network Engineering Section Manager

9:51am – 10:10am Technical Project Review

Mitch Howard, Network Engineering Unit Manager

10:11am – 10:22am OTech Fiber Ring – MAN Services

Cindy Sherrets, Network Infrastructure Unit Manager

10:23am – 10:43am CGEN

Jann Biggs, CGEN Service Manager

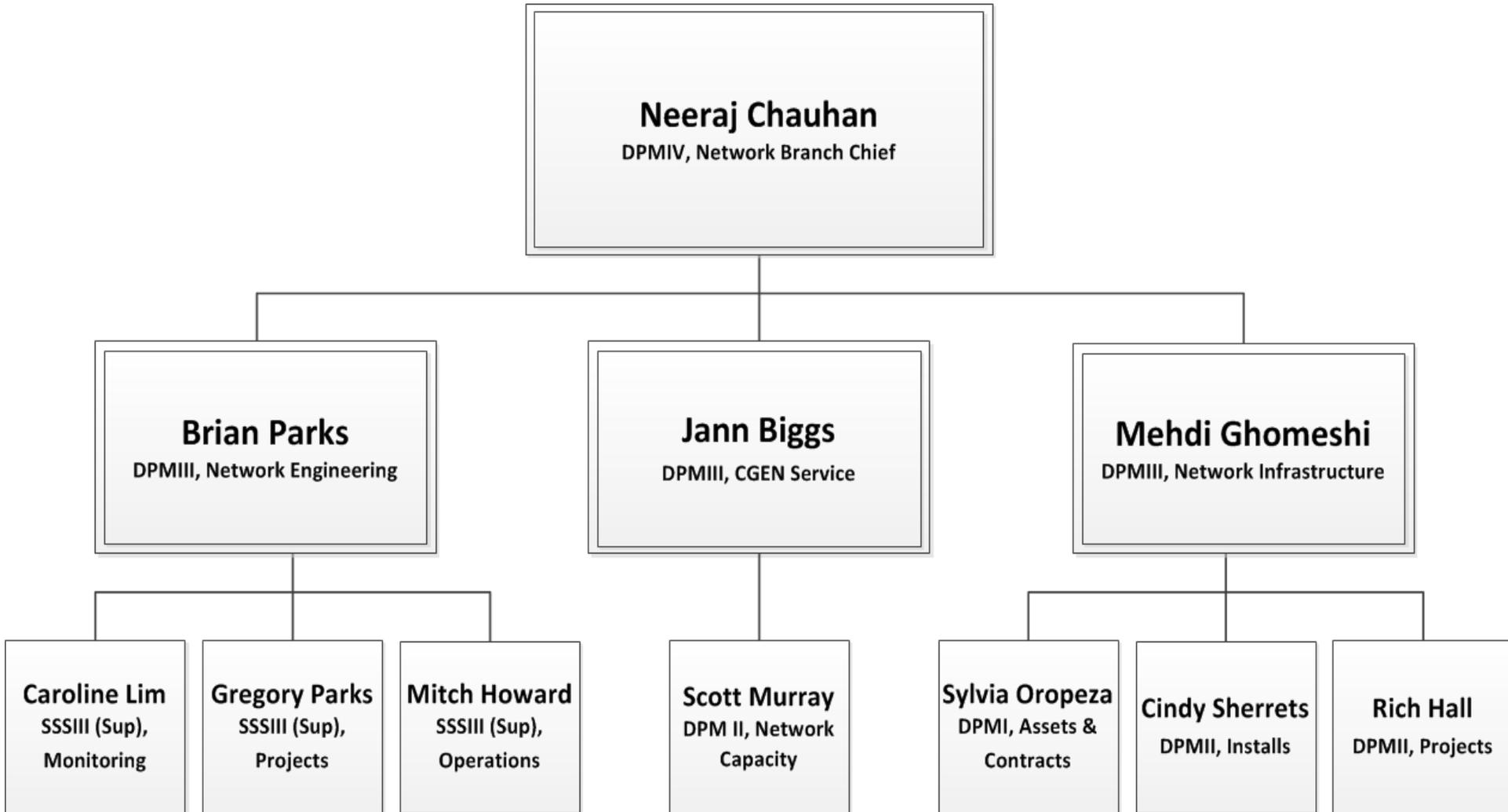
10:44am – 10:55am Overview of Outages

Brian Parks, Network Engineering Section Manager

10:56am – 11:00am Q and A



OTech Network Organization



Updates on Projects and Major Efforts



Gregory Parks
Network Project Engineering



Updates on Projects & Major Efforts

- Network Equipment Software Upgrades
- Network Equipment Hardware Refresh
- Network Redundancy
- CGEN Southern California iHub



Network Equipment Software Upgrades

- Benefits
- Initial Implementation Strategy
- Ongoing Implementation Strategy
- Communications and Notification
- Sample Timeline
- Software upgrade lifecycle



Benefits

- Improves security
- Standardize code for each platform
- Enables new functionality – Cisco Call Home



Initial Implementation Strategy

- Worked closely with Cisco
- Begin in low impact area of the network, by platform
- Initially deploy on a small subset, then monitor
- If successful, deploy code on the rest of the platform



Ongoing Implementation Strategy

- Two “Super Sundays” per year will be reserved by network for code upgrades
- Intent is to minimize disruption and/or conflict with other changes
 - Customer implementations or changes
 - Other OTech planned changes or activities



Communications and Notification

- These code upgrades will be widely advertised and communicated
 - ENEWS
 - SCN
 - Change notification
 - Customer Delivery Division

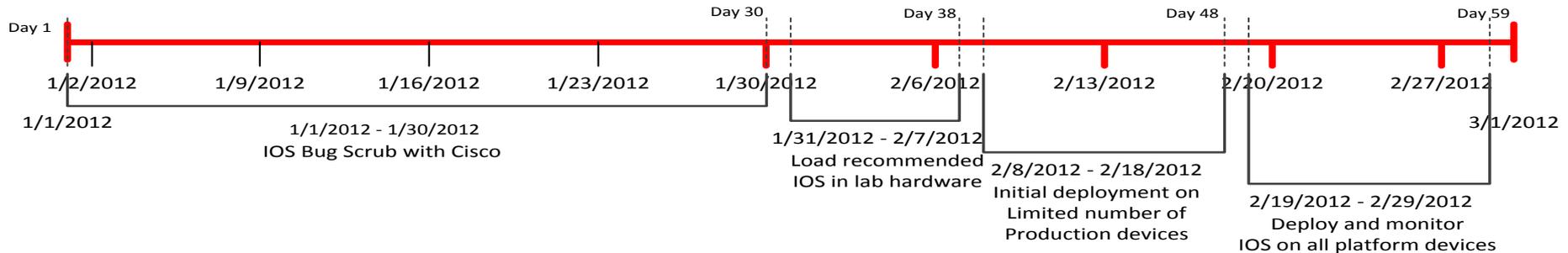


Sample Timeline

Network Equipment Software Upgrades Timeline (Initial Implementation)

Below is a timeline indicating the major activities involved in a platform IOS upgrade, and how much time is typically required for each major activity. This example shows the time spans for the IOS upgrade if the effort is initiated January 1st. For the initial implementation, several platforms require upgrades, so this process will be repeated for each platform until all platforms are on current code.

IOS Deployment for a single platform



There are four major activities involved in a platform IOS upgrade: 1) IOS Bug Scrub, 2) Lab testing of the recommended version of IOS, 3) Initial deployment on a small subset of the platform, and 4) deployment on the entire platform.

The **IOS Bug Scrub** activity is critical to a successful deployment of new code. The bug scrub process involves OTech technical staff working closely with Cisco to document features used for a given platform. Cisco then evaluates IOS software for bugs that could affect the features in use. The outcome of this process is a recommended version of IOS that has been evaluated against features used by OTech and found to be free of bugs that could impact the platform.

The **Lab Test** activity involves loading the new code on a platform device in the test lab to verify whether the format of the configuration is compatible with the old version of code without building scripts for new or changed default values .

The **Initial Deployment** activity results in the new version of code being deployed on a limited number of platform devices, which are then monitored for several days to verify there is no negative impact on the platform or on customer traffic.

If the **Initial Deployment** activity is successful, the **Platform Deployment activity** results in the new version of code being deployed on all platform devices. The platform devices are then monitored for several days to verify there is no negative impact on the platform or on customer traffic.

If at any point problems or issues are identified with the new IOS code, the process will stop. If necessary, the most recent activity will be reversed to mitigate any negative impact. OTech will engage Cisco to determine the cause of the problem/issue, and whether the process needs to start over again with the **IOS Bug Scrub** activity.

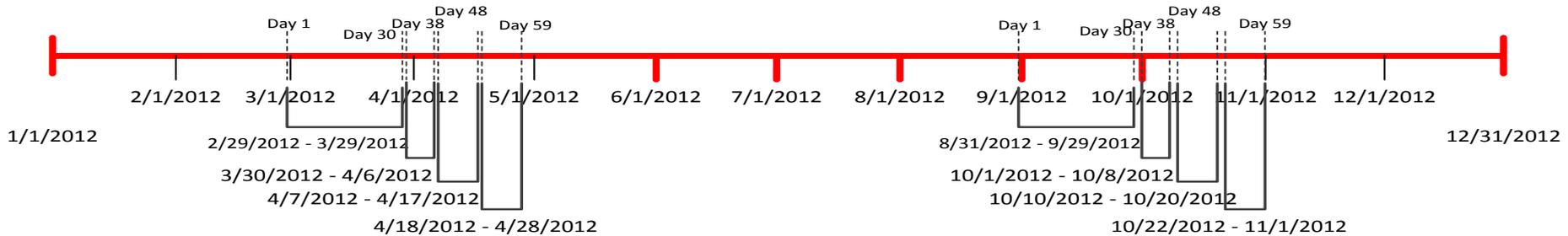


Sample Timeline

Network Equipment Software Upgrades Timeline (Ongoing Implementation)

Below is a timeline indicating the major activities involved in a platform IOS upgrade, and how much time is typically required for each major activity. This example shows two upgrade windows per year that will be used to keep IOS code current in the future.

IOS Deployment for a single platform



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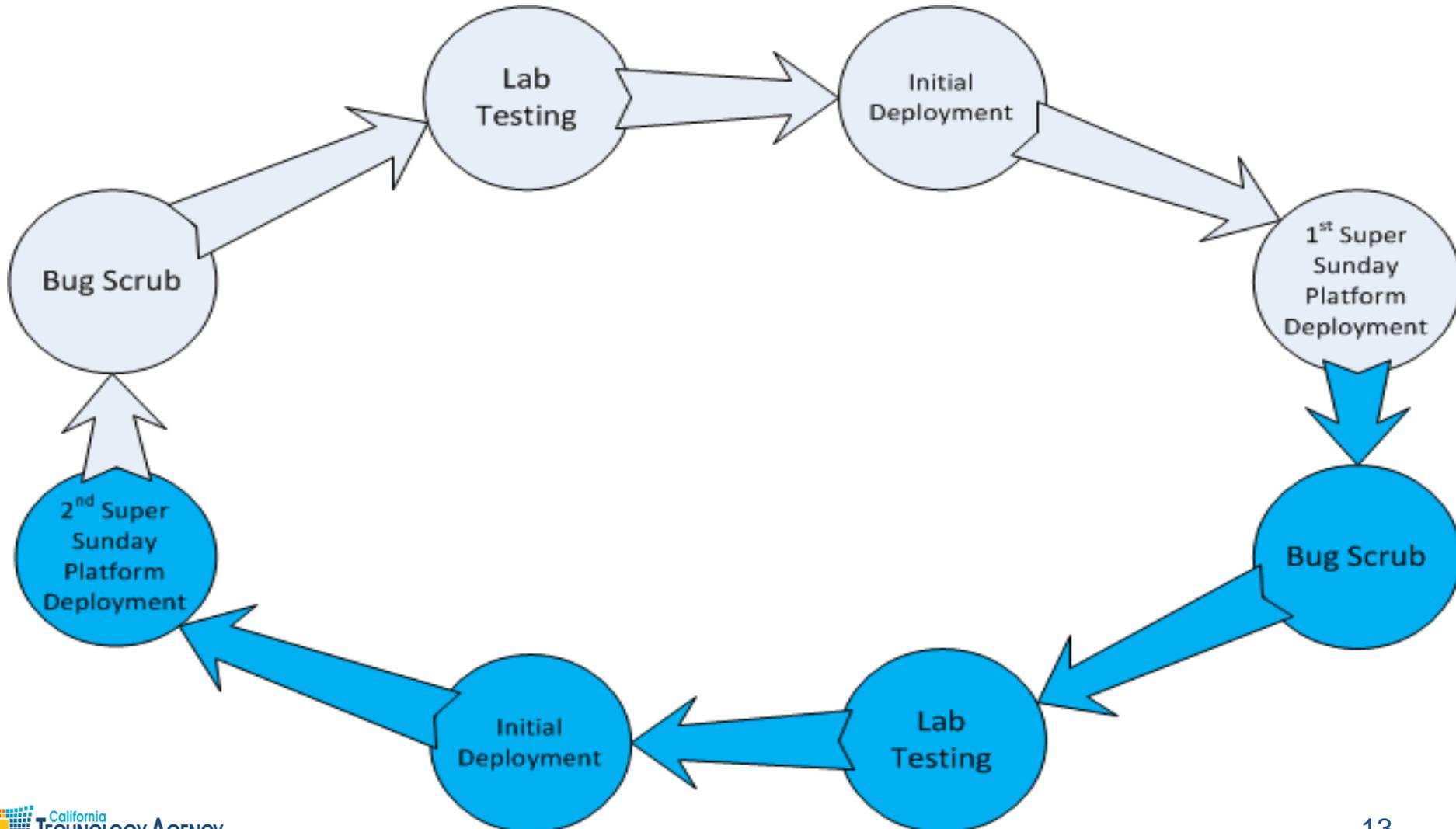
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Software upgrade lifecycle





Network Equipment Hardware Refresh

- Quarterly hardware orders
- Initial focus – hardware that is at or approaching End Of Support or End Of Life (EOS/EOL)
- Refresh order completed this summer, implementation in progress
- We are currently working with Cisco on the next order



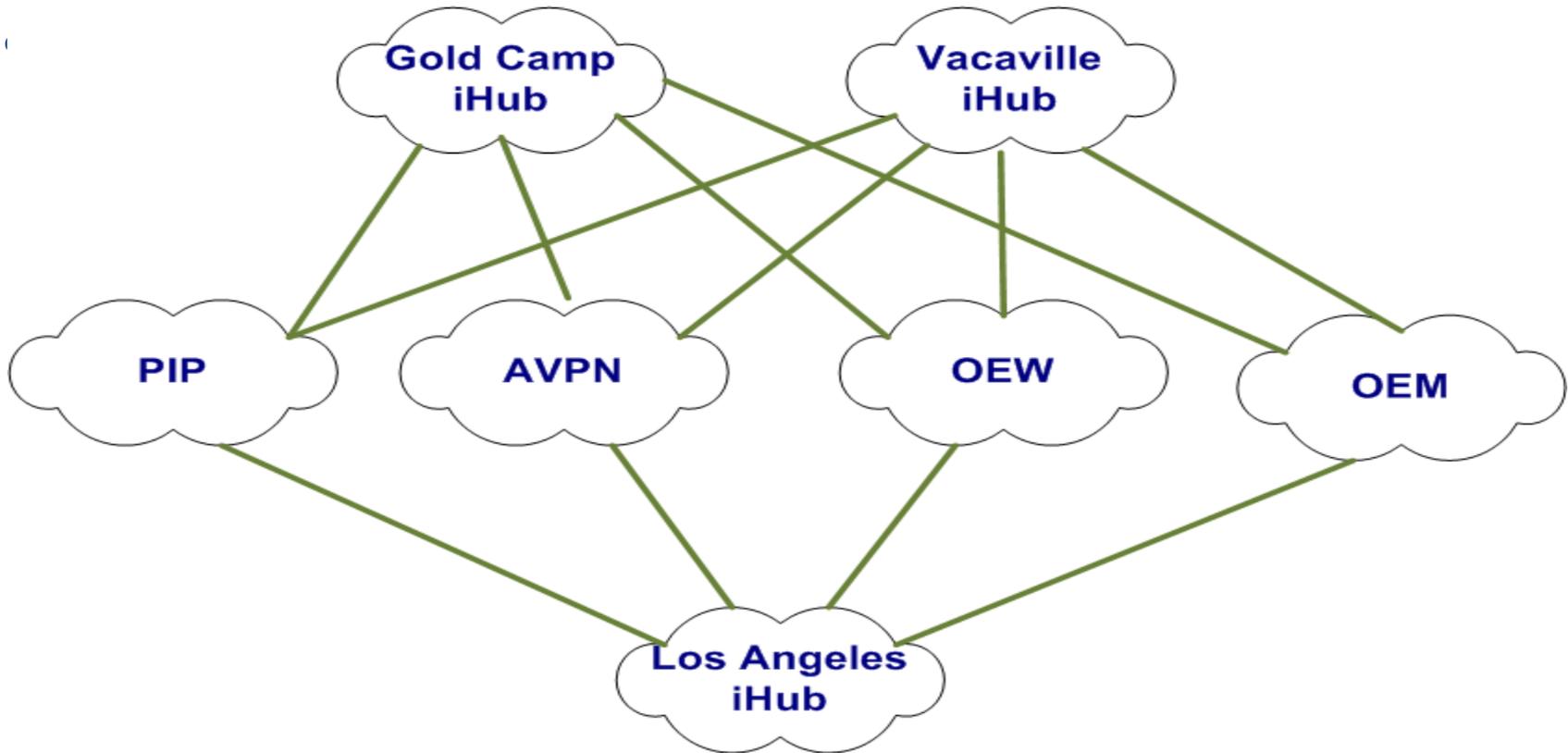
Network Redundancy

- Recent outages emphasize need for more robust redundancy
 - OTech campus networks
 - Internet Service Provider (ISP) connections
 - CSGNet
 - CGEN (i-Hubs)
 - Customer networks
 - OTech staffing



Southern California iHub

- CGEN Southern California iHub



Technical Project Reviews



Mitch Howard
Network Enterprise Engineering

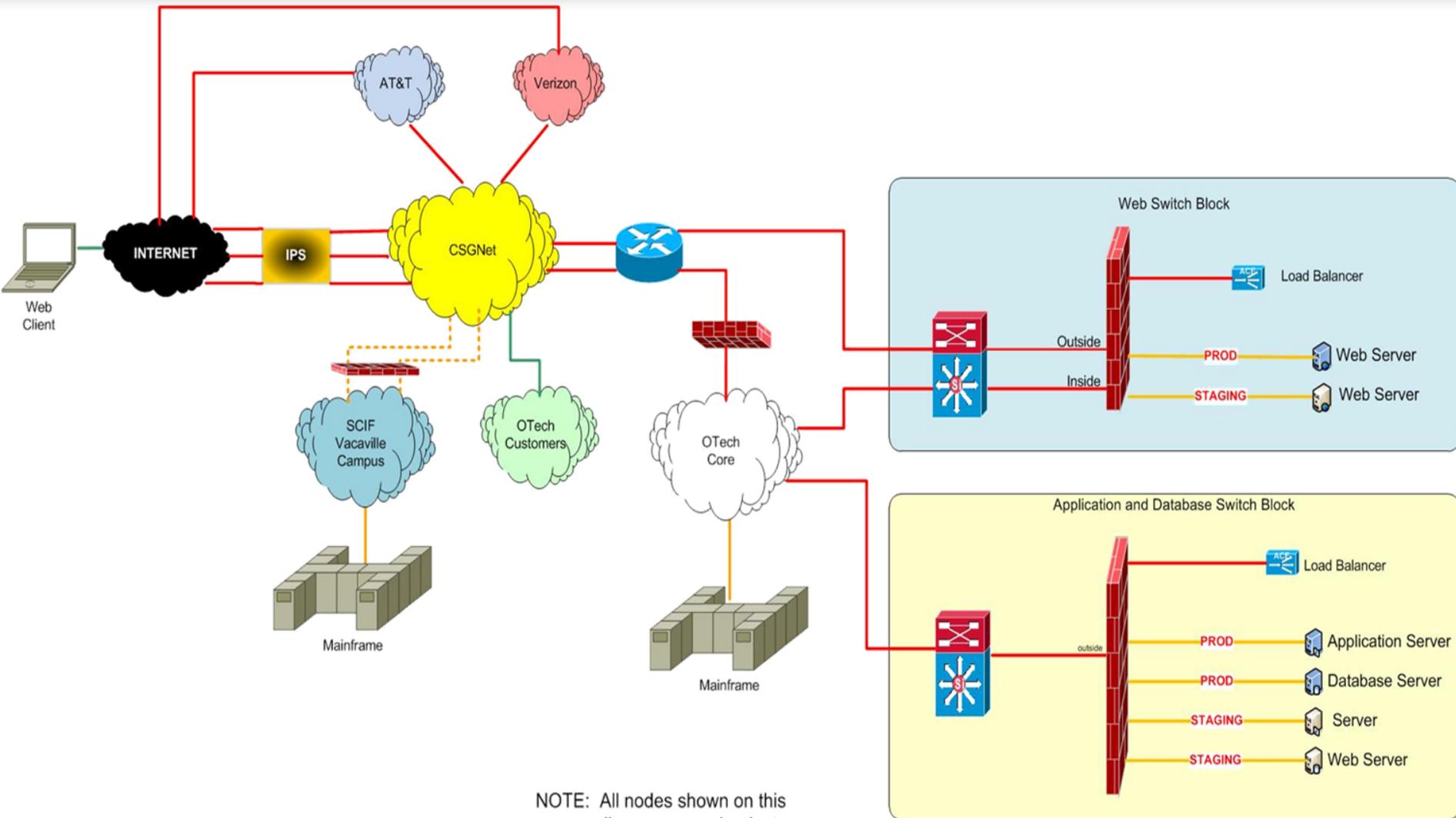


Technical Project Reviews

- Firewall Migrations
- Data Center Network Capacity
- IPv6
- IPv6 Security Considerations
- OTech Fiber Ring (OFR) Technical Aspects



Technical Project Reviews



NOTE: All nodes shown on this diagram are redundant.



Firewall Migrations

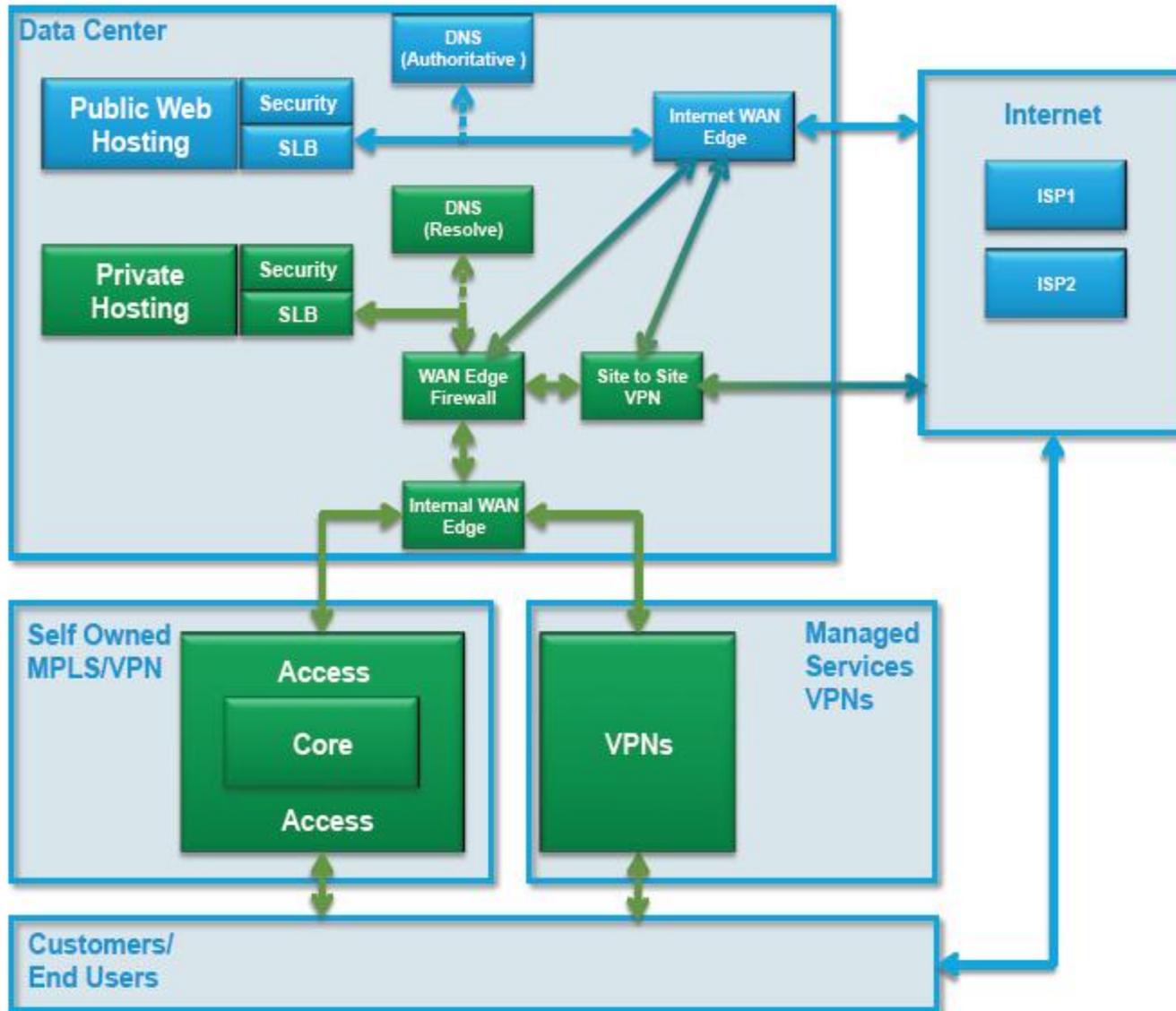
- Firewall Upgrades
- Scope
 - Migrate 9 EOL Firewalls
 - 7 Firewalls Migrated Successfully
- Considerations
 - Technology
 - Procurement
 - Resources and Timeframes
- Lessons Learned
 - Advanced Communication



IPv6

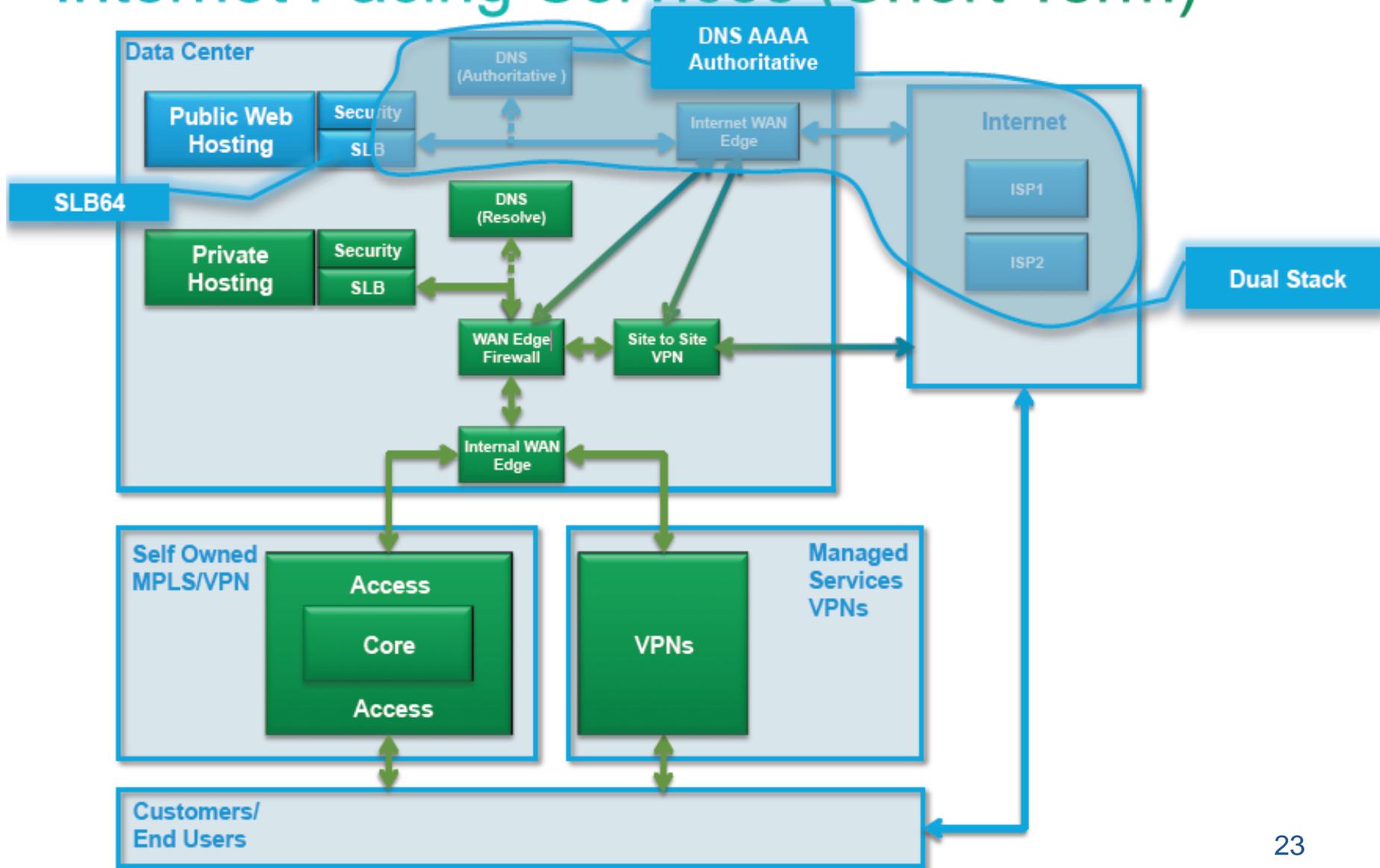
- IPv6 evaluation and implementation
- Scope
 - Implement IPv6 on limited number of devices and test
 - Test to internet Successful
- Challenges/Issues
 - New Technology
- Lessons Learned
 - We are ready for IPv6
 - <https://cio.gov/building-a-21st-century-government/transition-to-ipv6/>

Network Architectural View

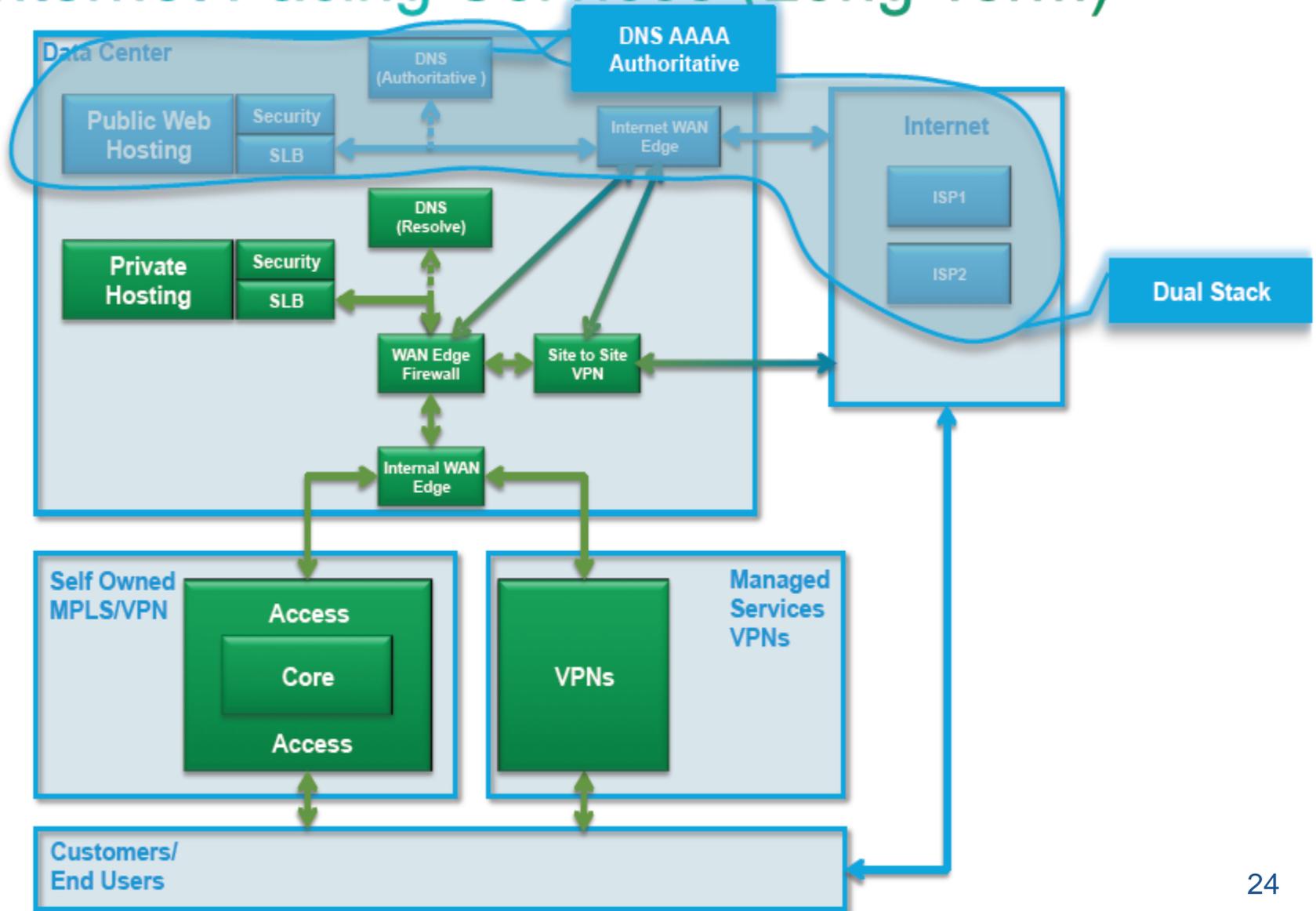


IPv6 Data Center Services

Internet Facing Services (Short Term)

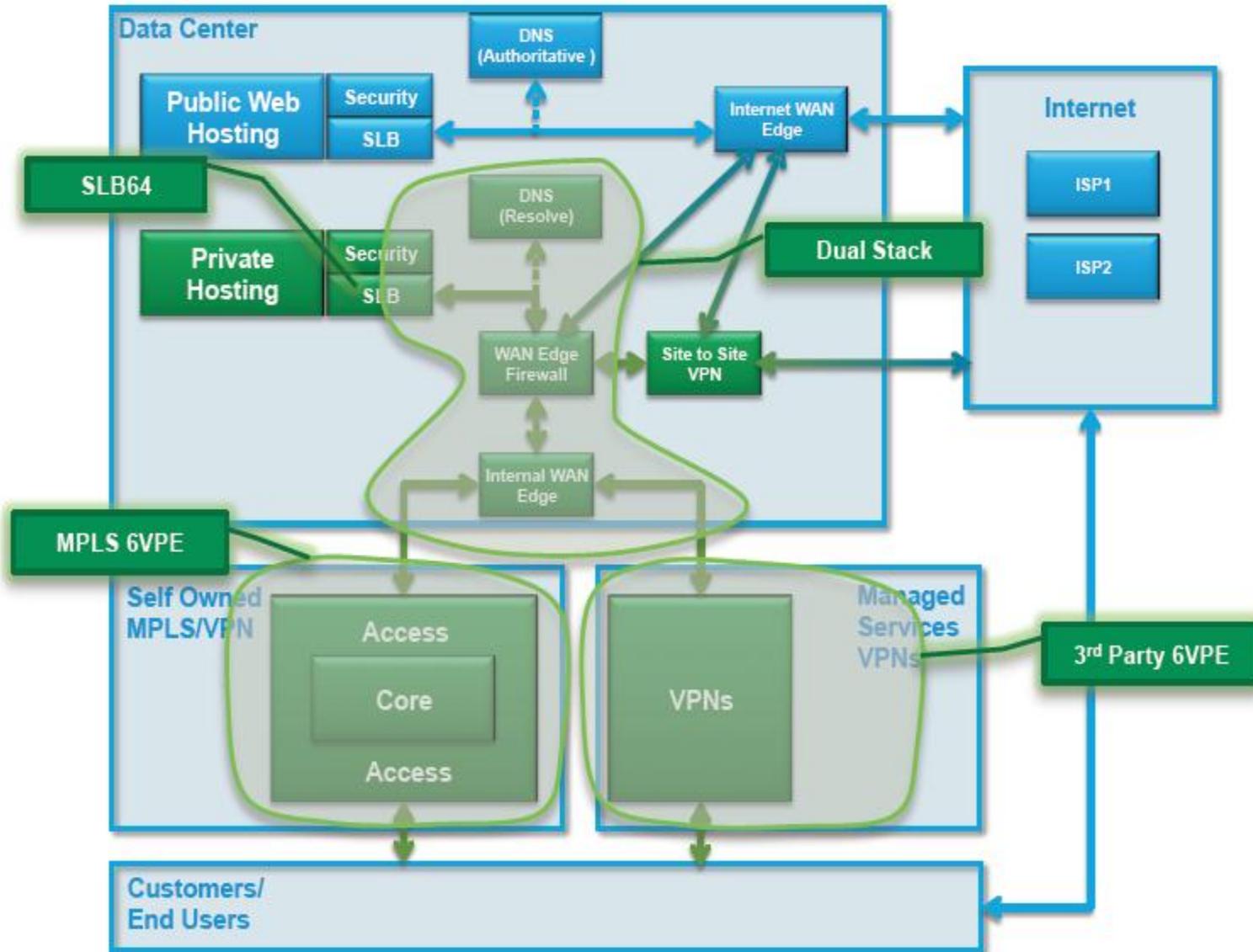


IPv6 Data Center Services Internet Facing Services (Long Term)



IPv6 Data Center Services

Internal Hosting Services (Short Term)





IPv6 Security Considerations

- IPv6 has several advantages
 - IPSEC auth, supports mobile, elims most NAT, # IPs
- Security Disadvantages Exist
 - Can “tunnel” to bypass IPv4 monitoring
 - DNS resource exhaustion greater
 - Dual stack provides dual attack vectors
 - Inspection devices may have issues
(support?, coverage?, maturity?)
 - Complexity (errors?) of running multi stacks, complex numbering and protocols (troubleshooting...)
 - Knowledge maturity of support staff
(internal/external)



Network Capacity

- ITIL Model for Capacity Planning
- Determine Service Level Requirements
 - Categorize Types of Network Services and Quantify Expectations of the Customer
- Analyze Current Capacity
 - How is Network Hardware Being Used and Whether it Meets Needs of Users
- Planning for Growth
 - Determine Expected Growth and Ensure Network is Ready



Optical Fiber Ring

- OTech Fiber Ring (OFR) Technical aspects
 - Fiber Assessment to Evaluate Fiber Viability
 - Deployed Optical Equipment with 40 Wavelengths, 10-Gig per Wavelength
 - Multi protocol support (Ethernet, **Fiber** Channel)
 - IPv4 and IPv6 Enabled
 - MPLS Enabled
 - Connectivity to Data Centers and TMS Premium and Basic

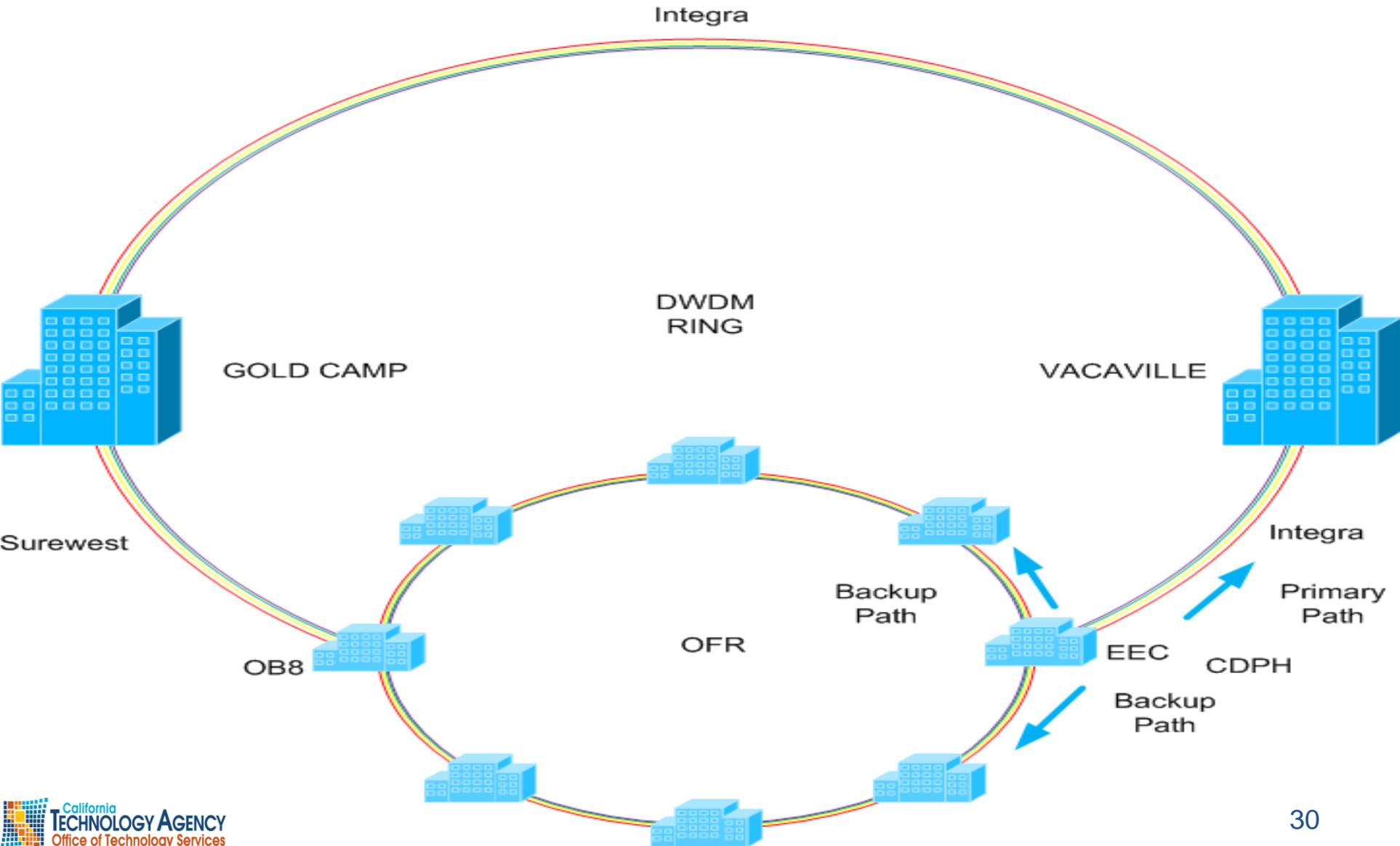


Optical Fiber Ring

- Considerations
 - Redundancy, Physical Path, Power, Layer 2, 3
 - Customer is responsible for extending fiber from MPOE to their location
 - Currently the service is used as a backup
- Lessons Learned
 - Maintenance
 - Fiber Assessment for Hybrid Bundles
 - Physical Access to Buildings



Optical Fiber Ring Service



OTech Fiber Ring (OFR) MAN Services



Cindy Sheerets
Network Implementation



OFR On boarding process

- **How to request OFR services**

Step 1

Submit CSS request for Evaluation of service availability and Costs. **Note:** This request will be closed after information has been provided.

Step 2

“OTech Fiber Ring Services are offered as a Secondary / Redundant connections and subject to Calnet II Contract provisions.” An exemption from Calnet II is required, refer to the exemption process link below:

<http://www.dts.ca.gov/stnd/pdf/stmm/050100.pdf>

Step 3

Submit CSS to implement OFR connectivity, exemption approval must be attached to SR.

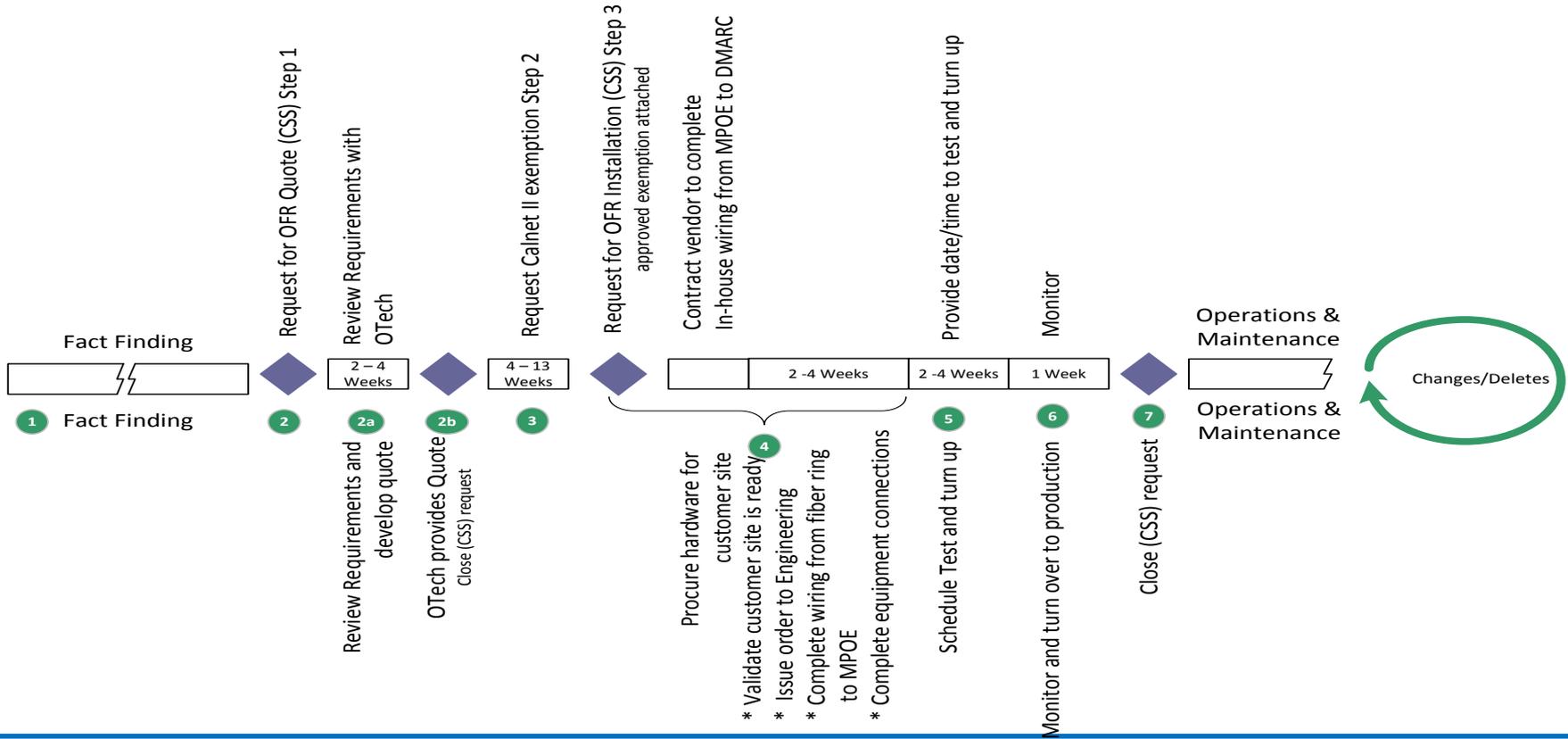


OFR On-boarding Timeline

OFR On-boarding Timeline

Customer

OTech



Note: Timelines shown are for first time on-boarding. Customer sites could vary on complexities which may cause timelines to vary.



OFR On-boarding Stages (Roles and Responsibilities)

Roles and Responsibilities	1- Fact Finding		2- (Step 1) CSS Request			3- (Step 2) Calnet Exemption	4 - Step 3 Request OTech Fiber Ring installation						5 - Test and Turn up			6 - Monitor		7 - Close CSS request	
	Business	Technical	2a - Request for OTech Fiber Ring evaluation/quote		2b - Close CSS request	Approval to order outside of the Calnet II Contract	Implementation of services						Move service into production			Stability testing / Production		Request for service is complete	
Time	Varies	Varies	2 Weeks			Varies	Varies	Varies	Varies	2 - 4 weeks			1 week			1 week		Milestone	
Stage	Customer	OTech	Customer	OTech	OTech	Customer	Customer	Customer	OTech	OTech	OTech	OTech	OTech	Customer	OTech	Customer	OTech	OTech	Customer
Customer needs to determine what the business benefits of connecting to the OTech Fiber Ring over Calnet services are.	OTech will assist with the assessment in section 2.	Customer submits a CSS request	OTech will determine if Fiber Ring services are available and what the requirements will be and schedule a vendor meet with Customer to identify cost for build out.	OTech provided cost to customer and Closed CSS request (from Step 1).	Customer will submit a justification for exemption to Calnet for approval. Link: http://www.dts.ca.gov/std/pdf/srmm/050100.pdf	Customer submits a CSS request (Step 3)	Customer works with building management company or contracts out to vendor to complete in-house wiring work	OTech validates customer in-house wiring is completed	Order is issued to Engineering for implementation	OTech works with vendor to complete wiring from fiber ring to customers MPOE	OTech connects fiber run to OTech equipment.	Testing connectivity	Provide OTech a date/time to test and turn up.	Schedule test and turn up with customer	Notify OTech of any issues	Monitor line to make sure its stable, move into production if no problems occur.	OTech will make the CSS request 'Avai' status for customer's approval to close	Customer will close CSS request	



OFR Documentation

Where to find this information?

Here is the link to our Service Catalog, Network Section, regarding OFR services.

- <http://www.servicecatalog.dts.ca.gov/man/man.asp>

Roles and Responsibilities, Timeline and Fact sheet documents can all be found using this link under service documentation.

California Government Enterprise Network CGEN



Jann Biggs
CGEN Services Section



CGEN – Migration Progress

- Migration numbers for customers in each stage:
 - 53 customers and 540 circuits are on the CGEN Service.
 - 53 customers in various stages between the design process and LAN cutovers have started.
 - Completion date is December 2013.



CGEN – Migration Process

Weeks





CGEN Migration Timeline

Sample CGEN Migration Timeline

Project Start

Lan Installs Complete

Vendor Selected

Kickoff w/vendor

Wan Installs Start

Project End

ODM

VDM

MOU Signed

Circuits ordered





CGEN – Vendor Responsibilities

Activities

- Provisioning
- 24 x 7 Service Desk
- Project Management
- Email Incident Notifications

SLAs

- CALNET Website
- www.calnet.ca.gov
 - MSA 1 ATT
 - MSA 3 Verizon
- Sub-set on next slide

Provide Portals

- Customer can monitor own circuits/routers
- Customer can monitor incident tickets
- Customer can run reports
- Individual customer training
- Monthly web-based demonstrations



CGEN – Vendor SLAs

	Category	Objectives – both vendors
1	<u>Availability</u> The same for both vendor	DS1 – 99.5 OCX – 99.8 DS3 – 99.8 Ethernet – 99.5
2	<u>Catastrophic Outage Level 1</u> Total loss of two or more services at one address	Less than 2 hours
3	<u>Catastrophic Outage Level 2</u> A total failure of in the Contractor’s (or sub-contractor’s) network equipment nearest the End-Users locations. Or, a backbone failure.	Less than 30 minutes
4	<u>Catastrophic Outage Level 3</u> The total loss of more than one service type or the loss of any service type on a network wide basis.	Less than 15 minutes
5	<u>Mean Time to Repair - Major</u> 5 or more physical circuits (DS-1 or higher) at same address location affected by common cause.	Less than 2 hours
6	<u>Excessive Outage</u> An Excessive outage shall be defined as a trouble ticket that remains opened with the Contractor on a service, for more than twelve hours.	Less than 12 hours

Note: This is a brief, condensed version; consult the Calnet website for conclusive information.



CGEN – OTech Responsibilities

Vendor Management

- Provisioning
- SLAs
- Incidents
- Performance

Service Desk

- First point of contact
- Communication and escalation

Changes

- Service Requests for billable changes
- Remedy work orders for non-billable changes

Security

- OTech staff background checks and fingerprinting
- NIST 800-53 Standards, Moderate level
- IPS, IDS, DDOS

Service Improvement

- eBonding

Governance Board

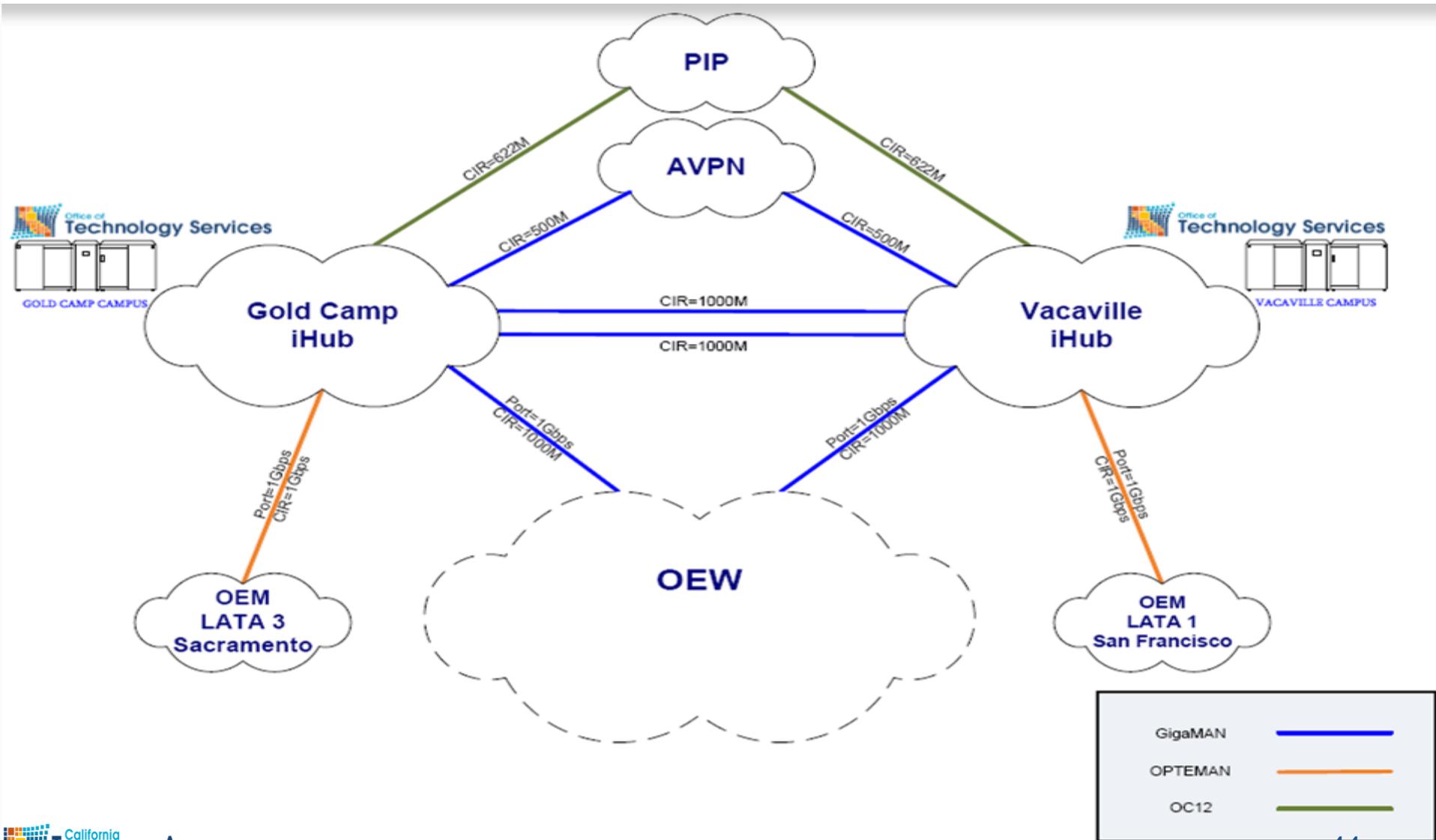
Infrastructure Consolidation Program – Network Workgroup



CGEN – Customer Responsibilities

- Keep local contact information current with OTech
- Use OTech Service Desk as first point of contact
- Use the vendor's portal to view service health, to create service reports, and to monitor incidents
- Keep portal access for users current with OTech
- Two vehicles for requesting changes
 - Service Request System (CSS) for billable requests or requests requiring a Form 20 to a vendor; OTech provides suggested formatting and language.
 - Remedy Service Request Management (SRM); OTech has established five template requests.
 - Bandwidth Utilization Reporting
 - Device Management and Monitoring
 - IP Addressing
 - Network Route Statement
 - Vendor Web Portal / Tool Access

CGEN – Infrastructure



Review of Outages Past Quarter



Brian Parks
Network Engineering



Summary of OTech outages

- 11/16 Emergency Change Service Disruption
- 11/20 Cable Change Service Disruption
- 11/27 Firewall Failed
- 12/05 DDOS on OTech DNS Servers
- 12/28 Loss of AT&T Internet Connection



Root Cause of Outages

- Human Error
- Hardware Failure
- Distributed Denial of Service Attack



Lessons Learned

- Continue Communications with Customers
- More Rigorous Peer Review of Changes
- Validate Accuracy of Changes
- Closely Monitor Capacity
- Standardize Categorization of Change Templates
- Enhance Defense in Depth Strategy



Corrective Actions

- During a Scheduled Change – Communicate!
- Add Peer Review to Change Requests
- Establish Procedure for comparing pre and post change configs to validate accuracy
- Expand capacity management function
- Review Standard Change Templates
- Implement Additional DDOS Capabilities

Questions and Answers

