



# Network and infrastructure enablement

Microsoft IT Showcase Course

*Get ready to be what's next.*

# Agenda



Environment and infrastructure  
Microsoft IT network challenges  
Internal customer feedback  
New network reality

# Environment and infrastructure



The Microsoft IT enterprise environment

Circle of influence

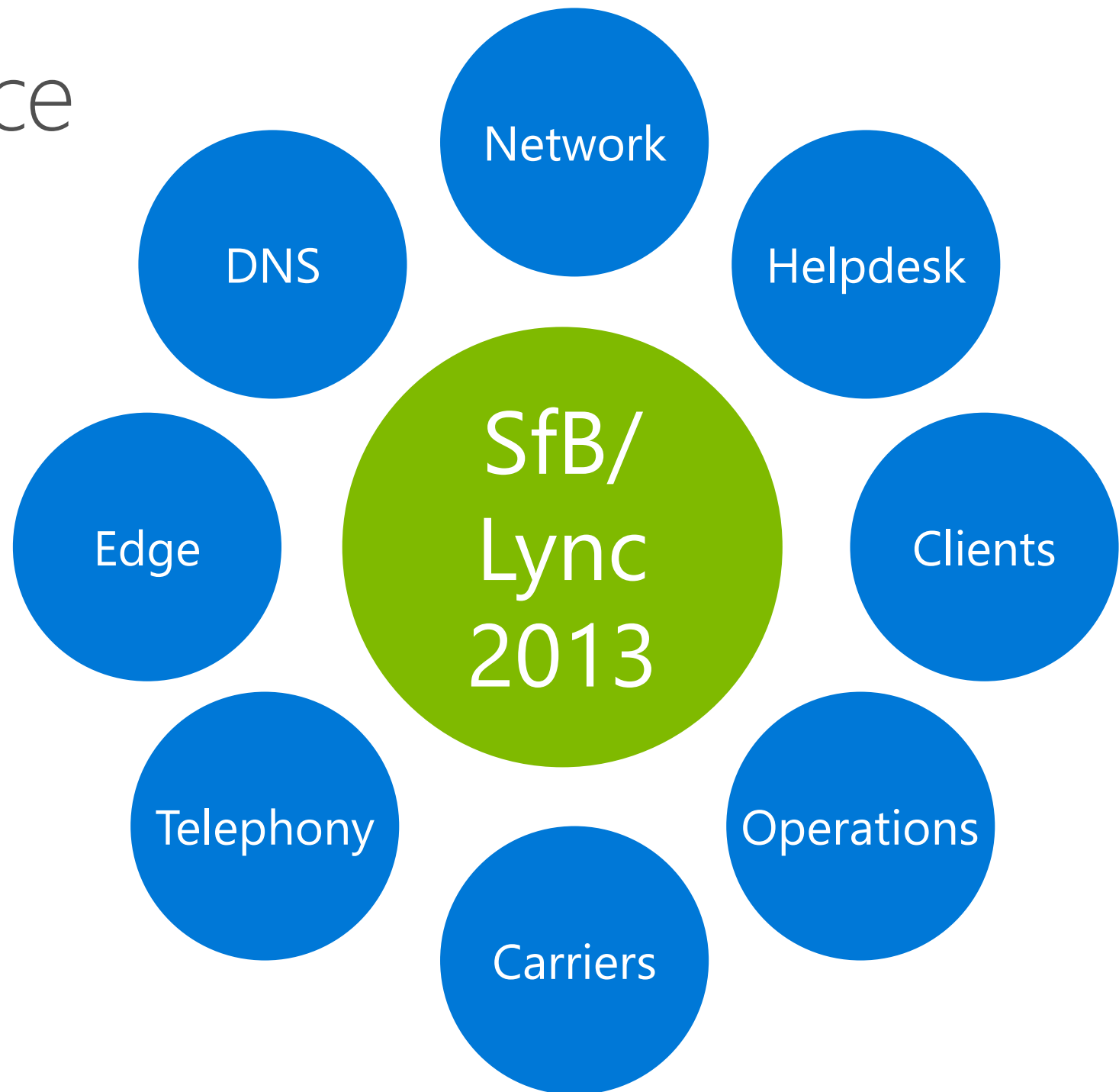
Optimizing the corporate network



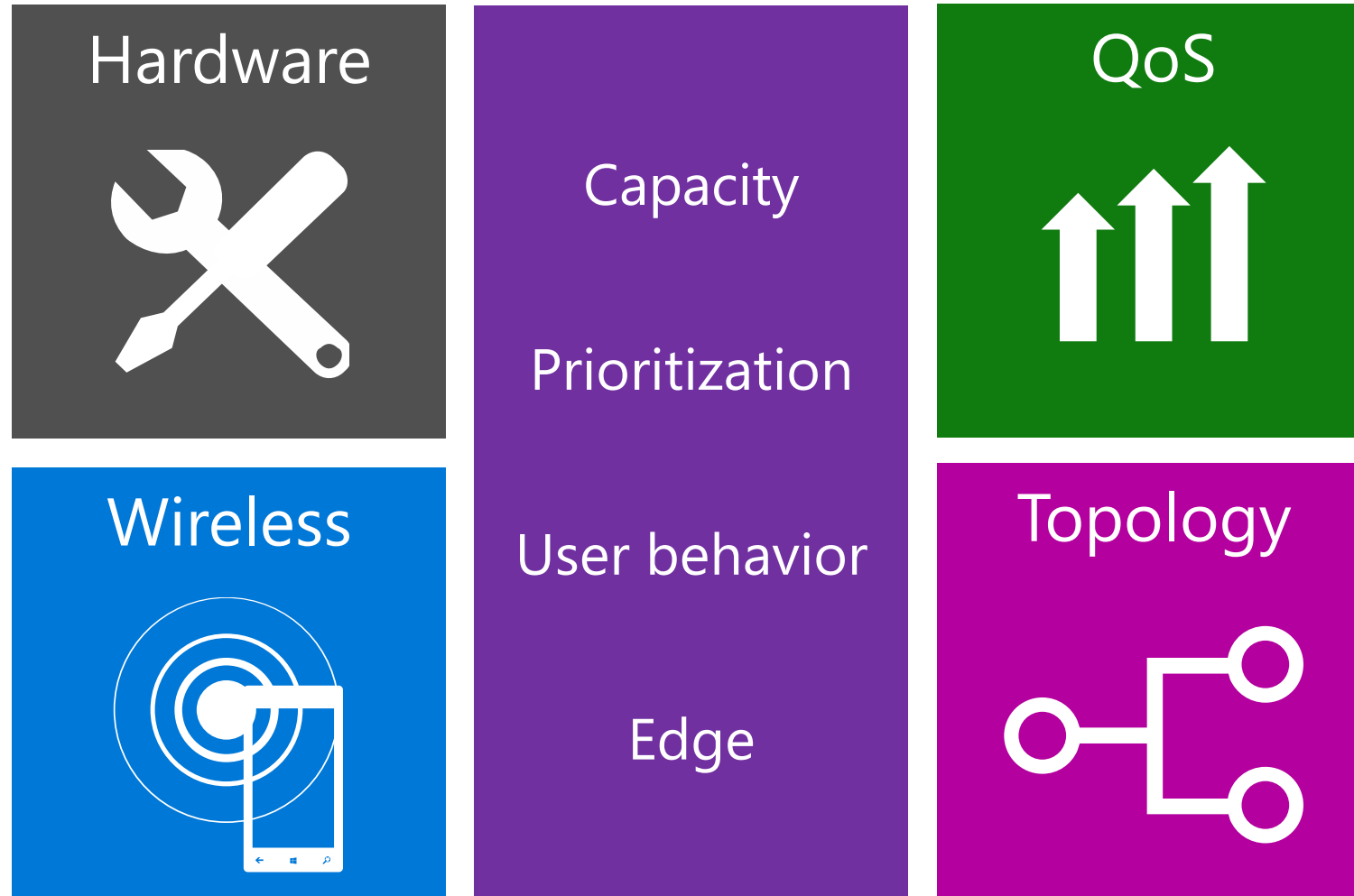
# The Microsoft IT enterprise environment

200K+ end users	Reducing app portfolio by more than 5% per year	This includes servers, user PCs and mobile devices	Windows Phone, iOS and Android devices	Presence in 120 countries	Sales team works 60% mobile	Using "big data" cloud services to secure the company
120K+ Employees	2.1K LOB apps managed by IT	1.2M Devices hit the Microsoft network	150K Devices sync via EAS	886 Site locations	80K Simultaneous remote connections	7B Security events monitored daily
New development and next gen apps	Traditional apps moving to private cloud and Azure IaaS	Multiple traditional identity environments	Federated cloud identity and strong auth model	Migrated 3K users per month	Online sites growing 4% and on-prem declining at 25%	3% monthly SfB call volume growth
30% LOB apps run on Azure PaaS	45K Production IaaS VMs	11 Active Directory forests	1 Azure Active Directory tenancy	140K Users on Office 365 Exchange	270K SharePoint sites in the cloud	7.9M Skype for Business calls/month

# Circle of Influence



# Optimizing the corporate network



# Summary

The Microsoft IT enterprise network is a large environment, with very active use of productivity services in the cloud. Nearly all FTEs use mobile and remote access.

# Microsoft IT network challenges



Microsoft IT network  
challenges



# Microsoft IT network challenges



## Cloud

- Abstracted from physical network and topology
- E/W to N/S traffic shift
- Tenant control of network
- Commodity, not custom



## Data

- Large volumes gathered for product engineering and sales
- Increased amount of data sharing between entities
- Frequent data movement



## Mobile

- Productivity from anywhere
- Devices "always connected"
- Network path between source and destination not controlled
- Demand for rich experiences



## Social

- People hop between personal and professional identities
- Personal devices contain corporate data and vice-versa
- Unmanaged apps/services



### Business Pressures

- Increase agility and delivery speed
- Decrease complexity and cost
- Provide a consistent quality of service
- Enable new and emerging markets
- Support outsourcing and partnerships



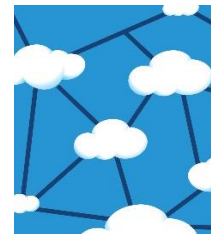
### Modern Devices

- Proliferation of networked devices in the corporate environment – BYOD, IoT, etc.
- Many operating systems, personal applications/data, and non-corporate identities
- Wireless connectivity – WLAN, cellular, etc.



### Cyber Threats

- Protecting our customers – Encryption in flight and at rest, limited admin models, multi-tenant isolation, etc.
- Protecting ourselves – Strong authentication, edge controls, internal sub-segmentation, attestation/auditing
- Detection versus prevention philosophy (active/passive)



### Network Ecosystem

- IPv4 address depletion
- IPv6 enablement – Clients IPv6 only; Services dual-stack
- Security requirements are driving network design changes
- Service level rationalization/standardization - Availability, capacity, performance, etc.

# Summary

The Microsoft IT network accommodates business and industry challenges, leveraging many technologies to deliver required capabilities.

# Internal customer feedback



Microsoft internal user  
feedback – Lync/Voice 2012

Network investment areas

Wireless program

Internet egress

Quality of service

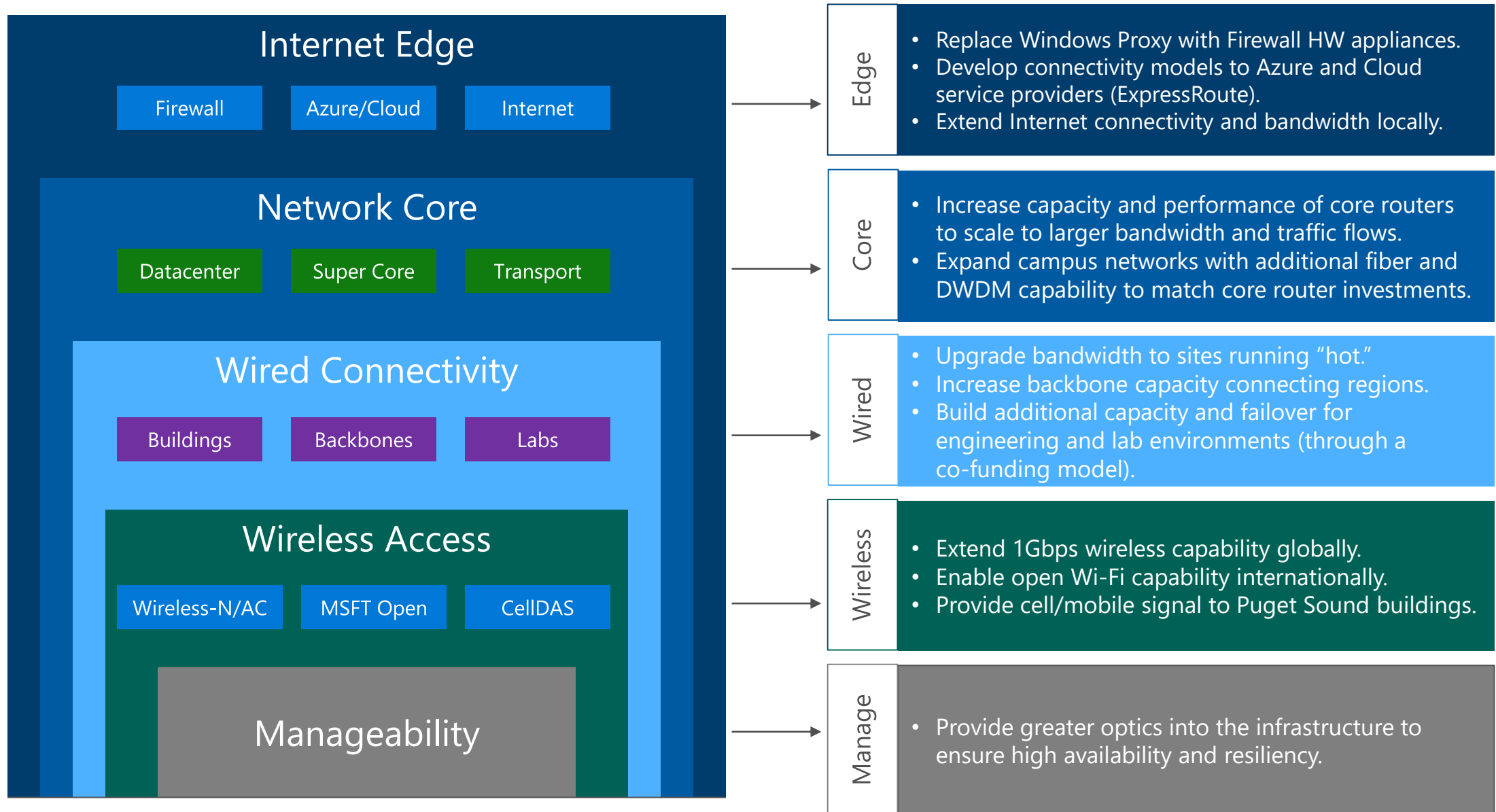
In-building and core  
infrastructure

# Microsoft internal user feedback – Lync/Voice 2012

- Satisfaction with the convenience of being able to make a call from anywhere that users have a PC or tablet with an Internet connection.
- Satisfaction with the ability to place peer-to-peer calls with their mobile device over their mobile network.
- Dissatisfaction with the UI in Lync, and they find the way to make a phone call with the number pad confusing.
- Dissatisfaction with audio quality when using SfB/Lync remotely.
- Dissatisfaction when using wireless connections on the corporate network.
- Dissatisfaction in Asia and EMEA with the availability of enterprise voice.



# Network investment areas





# Wireless program

## Customer needs:

- Additional capacity for wireless network to support NWoW and BYOD scenarios.
- Ease of Internet access for guests and users with unmanaged devices.

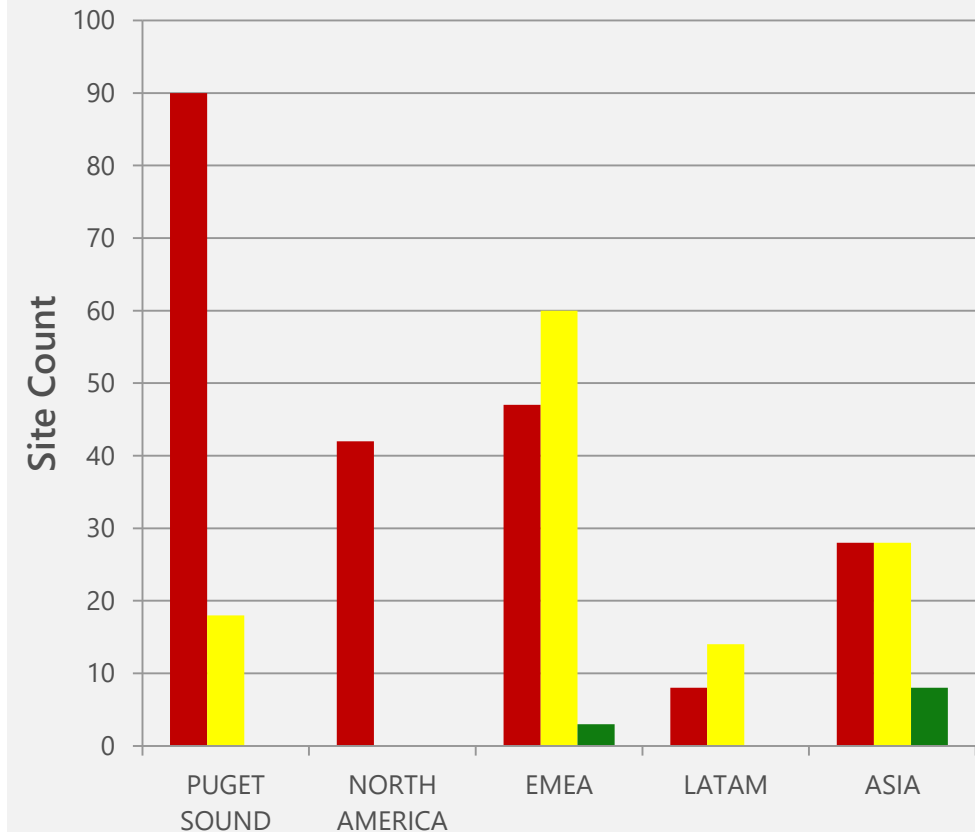
## Wireless upgrade

- Moved Puget Sound to 802.11n and 802.11ac.
- Rest of world going to 802.11ac.

## Microsoft open deployment

- Unsecured network allowing Internet access only.
- Accessed via open SSID with captive portal and consent.
- International based on regulatory/LCA review.

### Wi-Fi Pressurized Locations - 2013



**Red** – High Risk  
**Yellow** – Medium Risk  
**Green** – Healthy

	Red	Yellow
CPU Threshold	> 75%	> 65%
Memory Threshold	> 75%	> 65%
Clients/AP	>= 20	> 15

# Internet egress

## Customer needs:

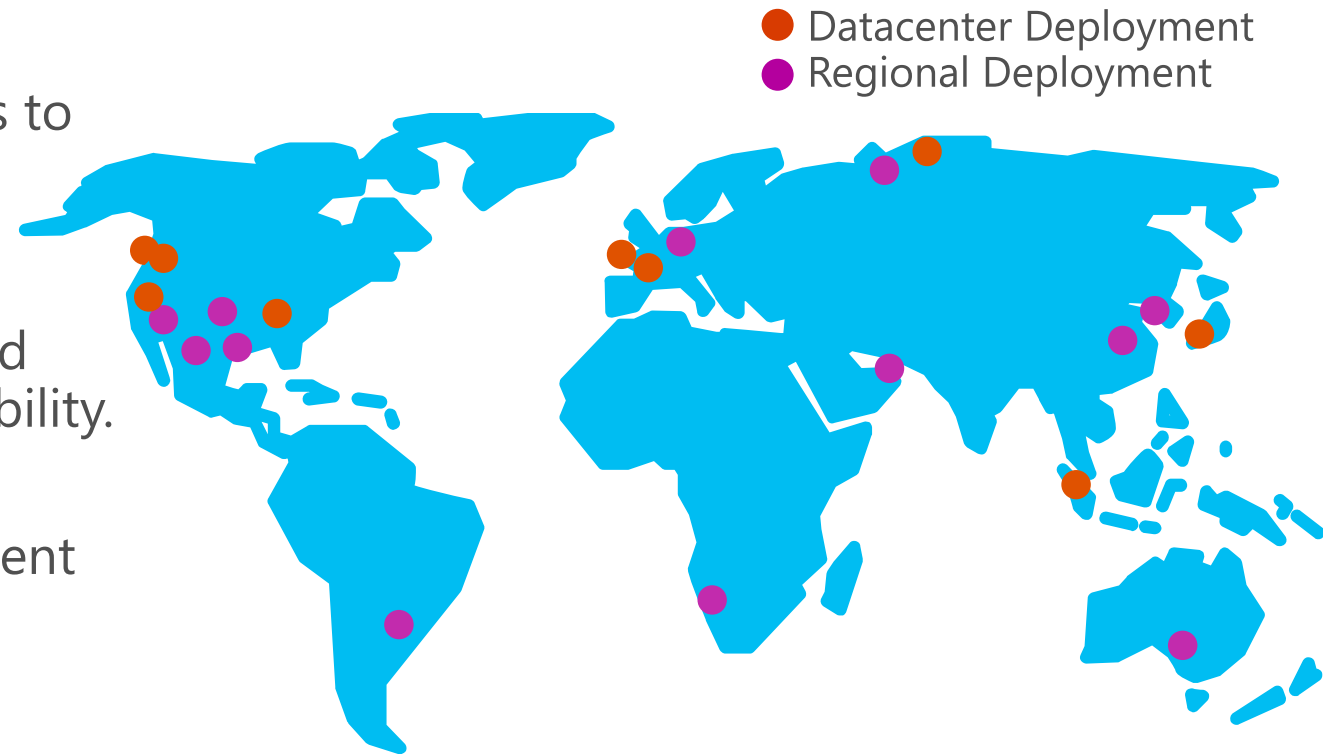
- Improved Internet performance and traffic flows for Azure/Cloud services.
- Additional Internet capacity for guest networks to support on-site showcase and training events.

## Internet egress locations

- Hardware appliances replaced proxy servers and provides more capacity, performance, and reliability.
- Supports growth into O365 and Azure.
- Exploring multiple additional regional deployment locations and timing.

## Guest Internet

- Select locations with dedicated local Internet broadband.
- Additional sites in the pipeline for consideration.
- Long-term plan is to standardize design and cost model.



# Quality of service

## Customer needs:

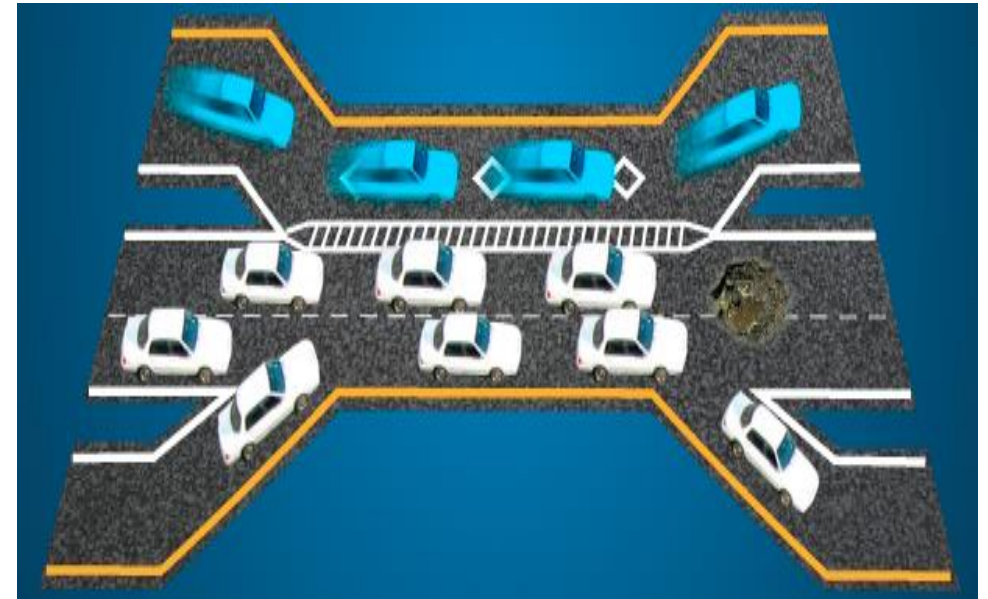
- Video and voice experience that is suitable for interactive meetings and presentations.
- Ability to use mobile, wireless, or wired devices.

## On-premises traffic classes

- Four primary classes related to SfB – Video (15%), voice (20%), WLAN (20%), and default.
- Ability to create an “Events” class when needed.
- Classifications are configured end-to-end and via automation, whenever possible.

## Edge marking controls

- Known origination points of SfB and events traffic are trusted, requiring intentional service placement.
- Traffic identified as voice/video is assigned to the appropriate queues automatically.
- Other CoS and DSCP markings are discarded.



# Building and core infrastructure

## Customer needs:

- Primarily driven by Microsoft IT/NIS to ensure a supportable and high-performing network.
- Capacity improvements required in equipment, not just circuits.

## End of life program

- Year over year funding investment to replace old equipment.

## Network core improvements

- Support greater bandwidth on the same infrastructure.
- Puget Sound super core and building aggregation.
- Internet core in Puget Sound.
- Datacenter core in Puget Sound.
- WAN Core in Puget Sound and Silicon Valley.
- Regional WAN backbones.

### Network Core Upgrade Initiative

Areas and Network Layers
Lab Aggregation
Internet Edge
Super Core
Building Aggregation
DC Core
DC Aggregation

# Summary

Microsoft internal customers have provided feedback that is shaping enhancements to Skype for Business/Lync and the infrastructure it is dependent on.



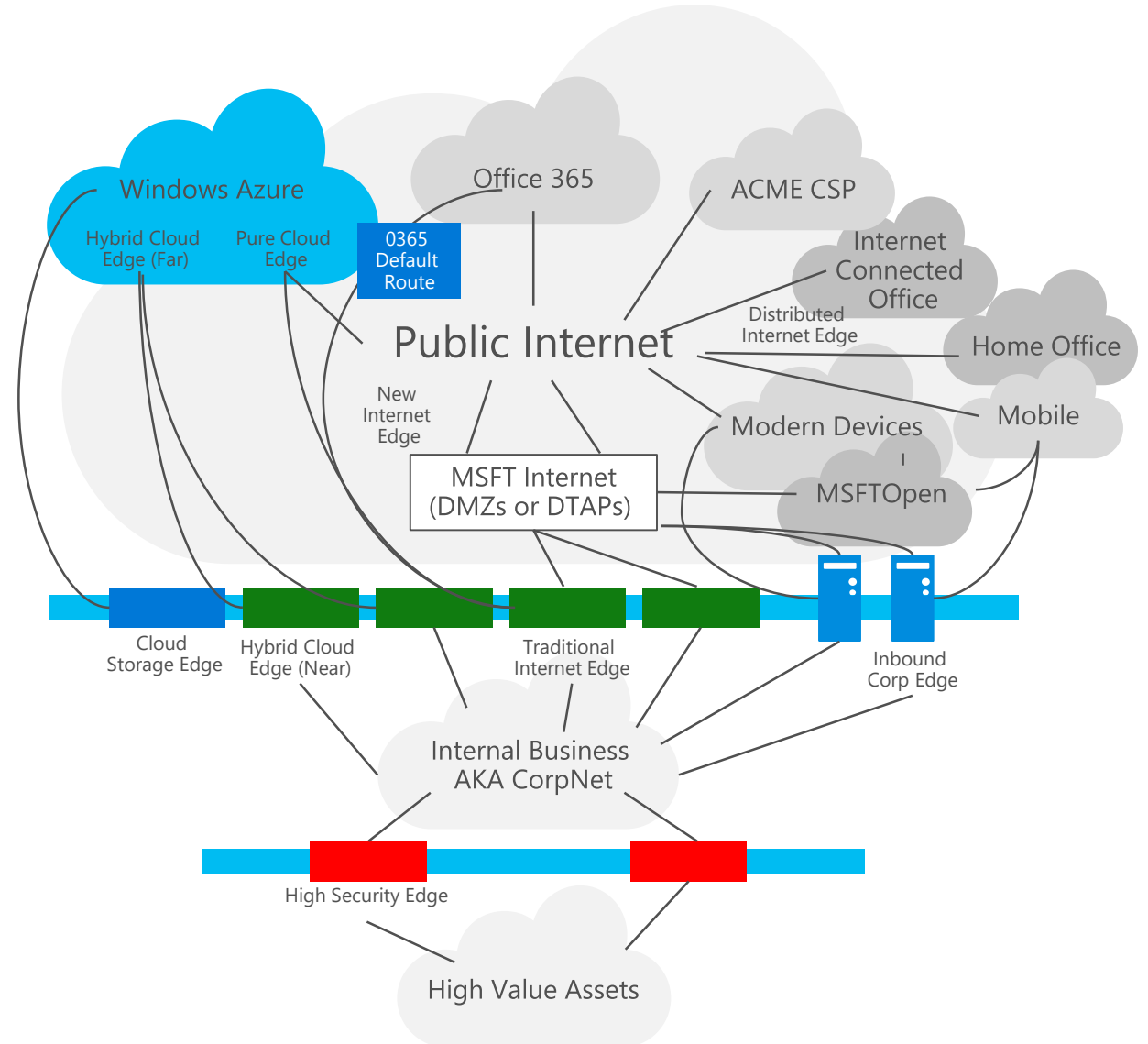
# New network reality – Cloud, BYOD, etc.



Emerging network reality  
ExpressRoute for Office 365

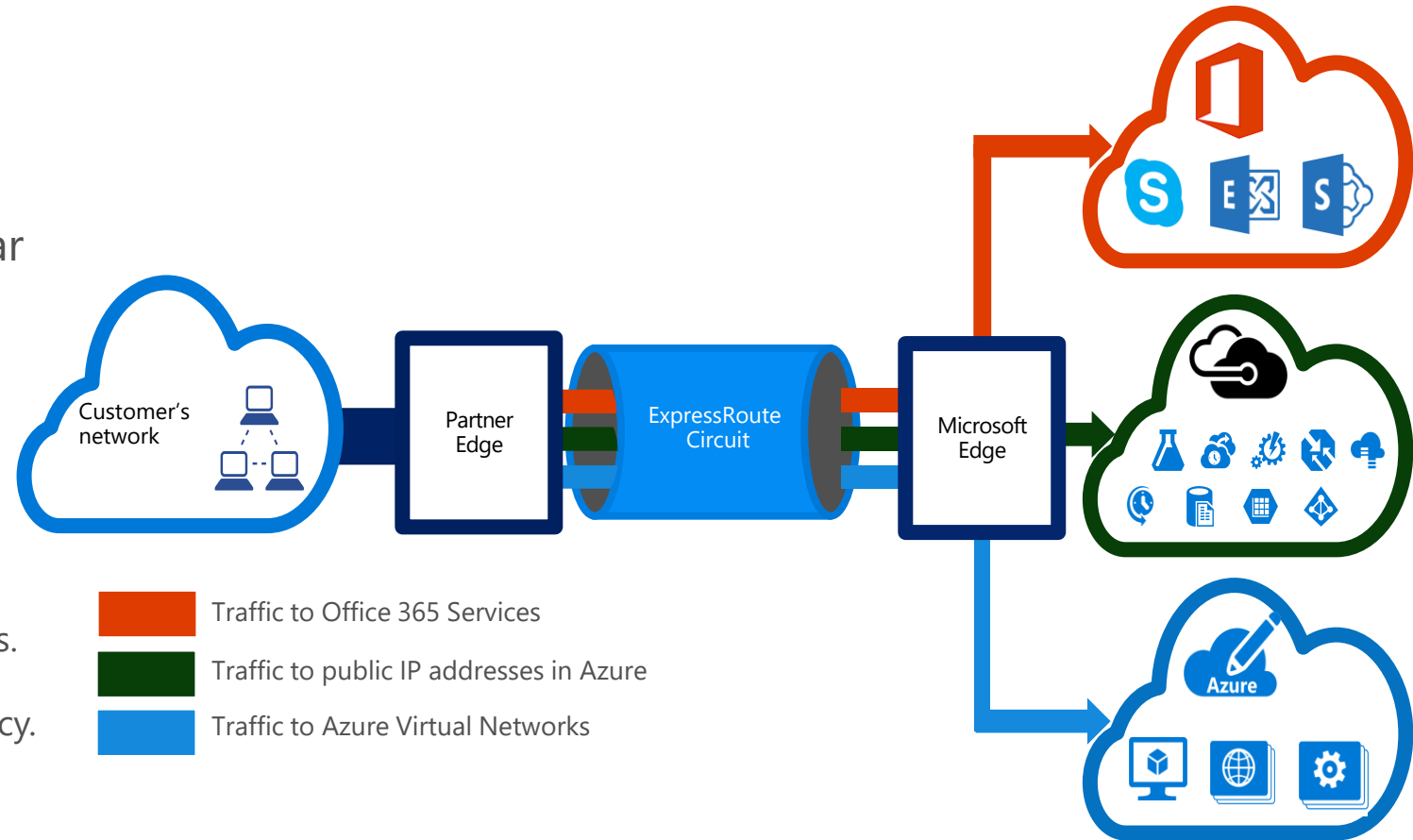
# Emerging networking reality

- Resources and productivity services are on the Internet.
- Many clients are not on-premises and behind your edge.
- Identity/ access are not tied to specific networks.
- Devices/Elements -> Software-Defined Services.
- Physical -> Virtual -> Abstracted.
- Even if we don't "own it", our customers expect us to understand and support it.



# ExpressRoute for Office 365

- ExpressRoute for O365 – Architecturally similar to ExpressRoute for Azure public services
  - Microsoft endpoints are public IPs.
  - Contextually similar from the security perspective.
  - Advertised via BGP with additional tagging.
  - Customer traffic is being SNATed on the way.
- Noteworthy differences
  - O365 flows include outbound and inbound connections.
  - O365 traffic may be highly distributed at the sources. (client) and destinations (services), with high concurrency.
  - QoS requirements for Skype for Business scenarios.
  - SNAT is at Partner/Customer layer.



<http://azure.microsoft.com/en-us/services/expressroute/>  
<https://channel9.msdn.com/Events/Ignite/2015/BRK2161>

# Summary

Usage patterns and client behaviors are changing the way Microsoft IT approaches their delivery of network services. For Microsoft public cloud services, Azure ExpressRoute is utilized to optimize network access.

# Summary

Know your dependencies and influences.

Network strategy is driven by defined business needs and outcomes, not just new technology.

Yesterday's network was not designed for today's uses—investment is needed.

New forces are further changing what we need from the network and fundamentally what the network is.





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# Appendix



Current site topology for  
enterprise voice

# Current site topology for enterprise voice

