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# QoE and QoS: the view from an online services provider

Microsoft as an online  
services provider

# Huge Global Scale 24x7

Microsoft Dynamics CRM Online

Windows Live

500M Active Live IDs  
59 markets and  
36 languages

Windows Live Hotmail

355M Active  
Accounts

bing

Over 4B WW Queries  
Each Month

msn

Over 459M  
Unique Users

Microsoft Advertising

14B Ads  
Per Month

Microsoft Office 365

Windows Azure

Windows Live SkyDrive

Windows Live Messenger

zune

XBOX LIVE

Microsoft Exchange Hosted Services

Windows Intune

Windows Update

Windows Live Essentials

Over 303M Users  
76 markets and  
48 languages

Over 6M Songs In  
The Catalog

25M Users

2-4 billion emails  
per day

200+ CLOUD SERVICES



PC



MOBILE

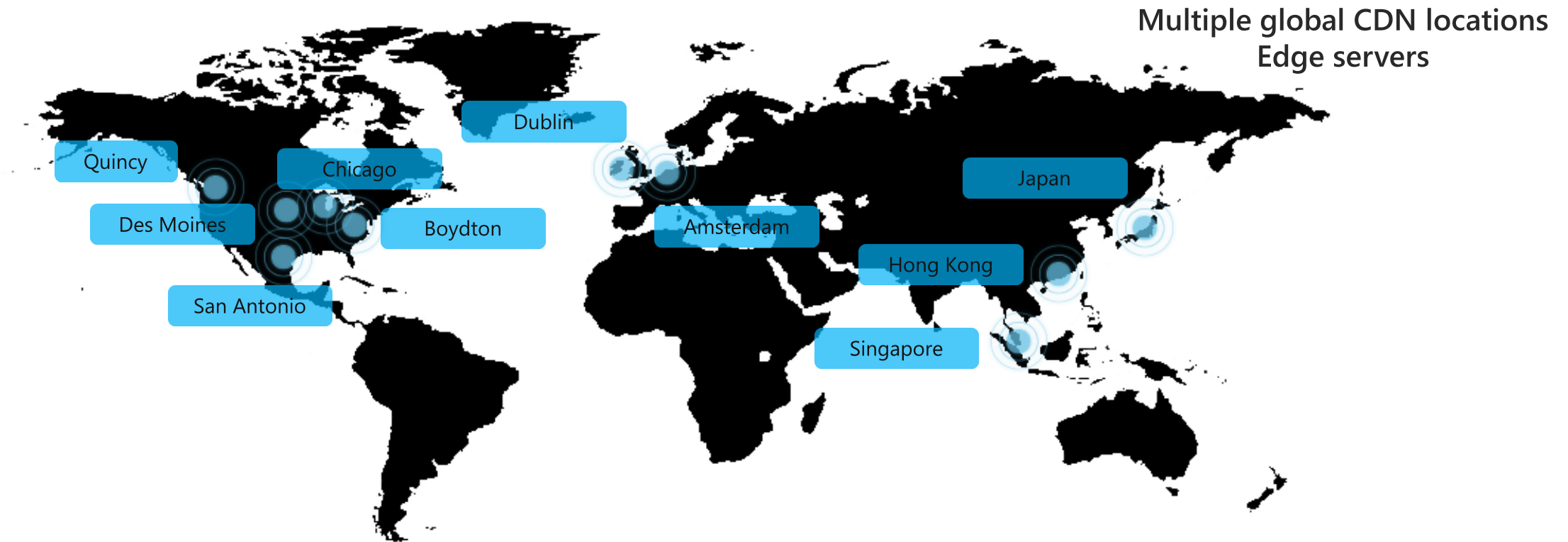


TV/HOME

# Driving Operational Excellence

State-of-art datacenters, Geo-replicated customer data	Secure, Compliant Infrastructure	2,000+ people in cloud infrastructure engineering and operations	30,000+ software engineers involved in Cloud-based activities	Carbon Footprint Reduction: Power Usage Effectiveness (PUE) 1.25
\$2.3B+ investment in Cloud Infrastructure		200+ Services delivered 24 x 7		99.9% uptime, \$ backed SLAs – 99.95%+ actual uptime

# Microsoft Datacenters



**Quincy, Washington:** approx 500K sq ft, 70MW, uses entirely hydro-electric power

**San Antonio, Texas:** approx 477K sq ft, 60MW, uses recycled water for cooling

**Chicago, Illinois:** 707,000 square feet with critical power of 60 MW, uses water side economization, containers

**Dublin, Ireland:** approx 570K sq ft, up to 30MW, uses outside air for cooling.

***"Datacenters have become as vital to the functioning of society as power stations."***

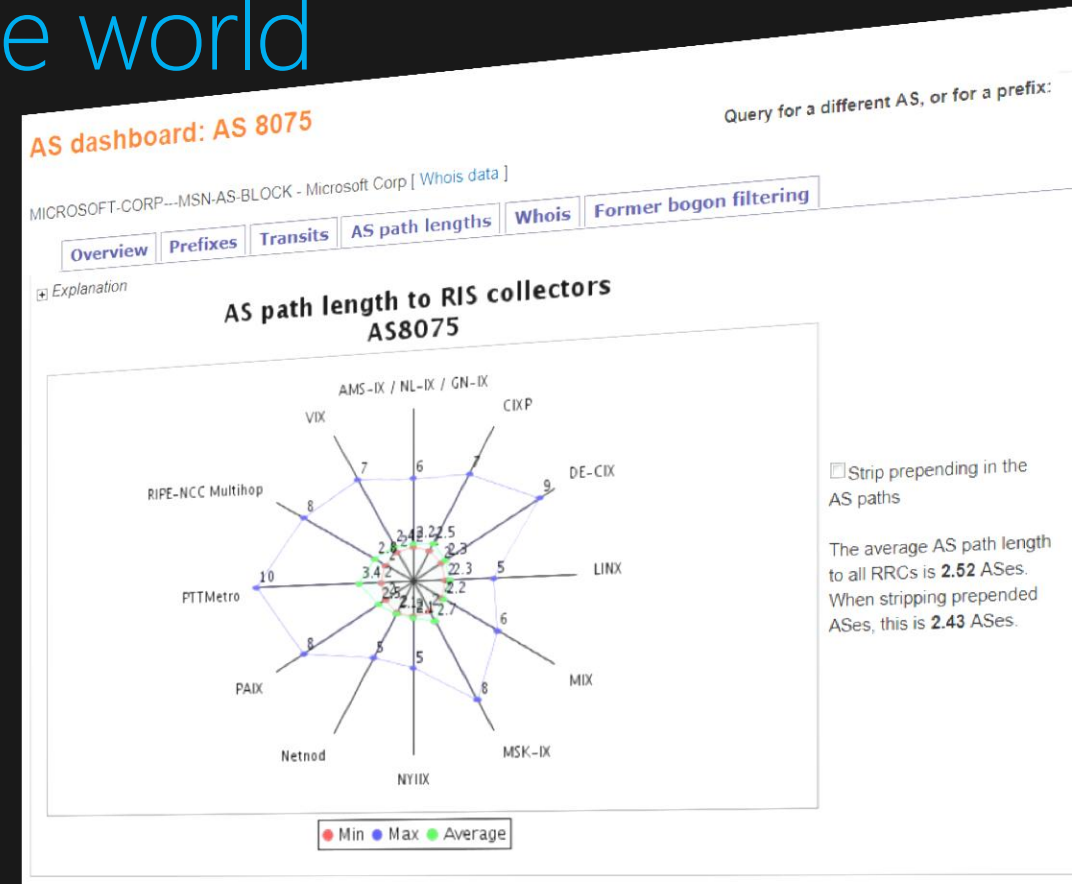
The Economist

# Microsoft network – did you know?

Microsoft owns and operates one of the largest non-telecom dark fiber networks in the world

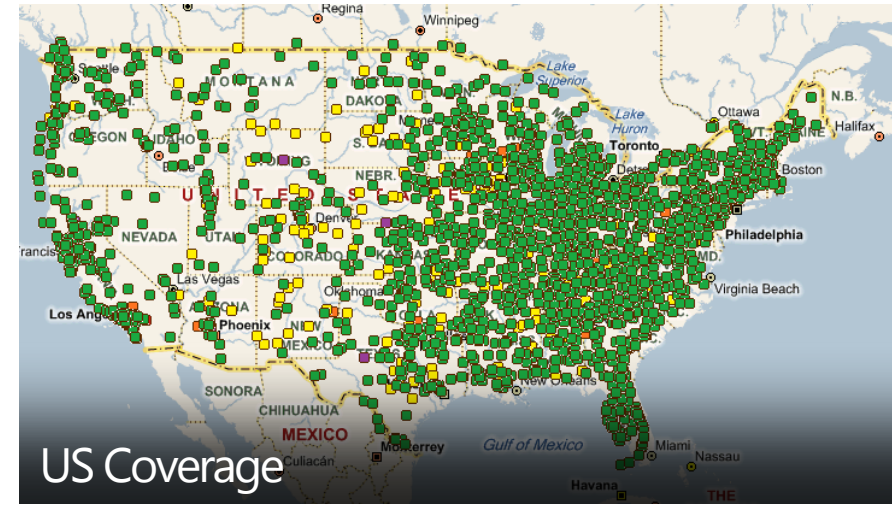
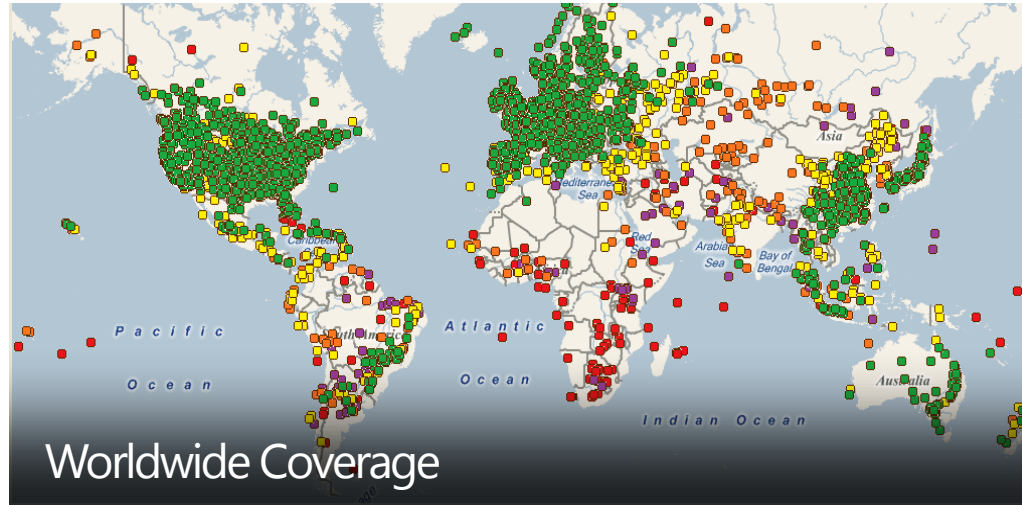
Geo Redundancy for Azure and Office 365  
Low latency

Microsoft's peering places it among the top interconnected networks globally

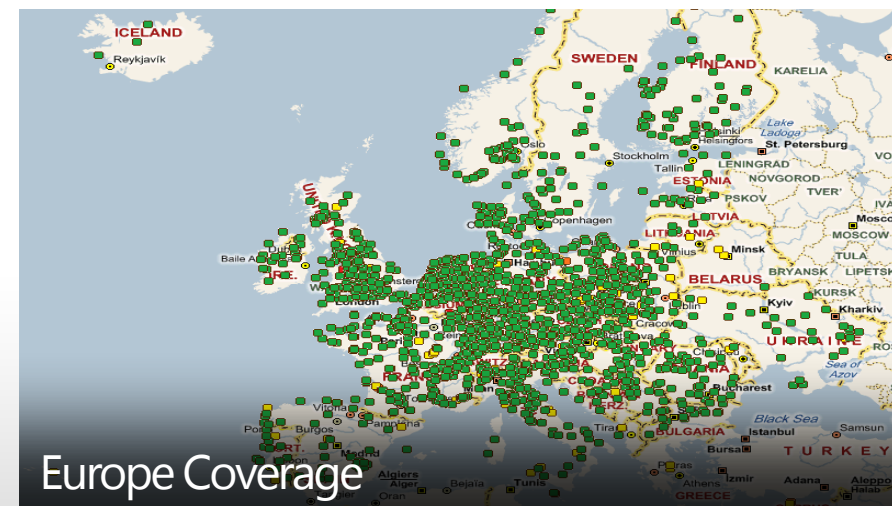
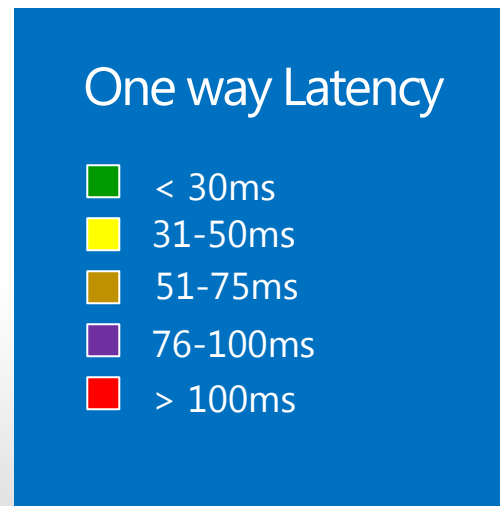


source: <http://www.ris.ripe.net/dashboard/AS8075>

# ECN Performance and Coverage: October 2011



“ One of the largest and most well-connected networks in the world. ”



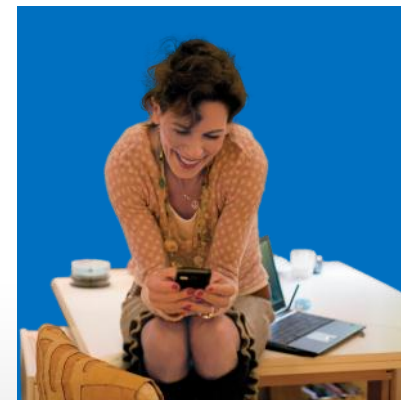
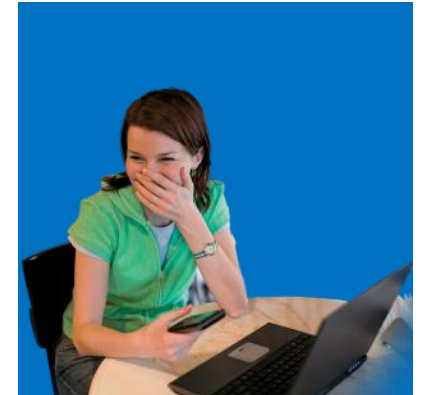
# Connectivity

## Optical Network Delivers Scalable DC-DC Bandwidth at Favorable Economics:

- Designed for high availability
- Manage latency during failures
- Technology evolution will support high capacity bypass/fast-lane scenarios

## Robust Internet Connectivity

- Over 3.0Tbit of potential capacity to over 1200 ISPs globally
- Many paths to many providers and ample capacity facilitates re-route around internet failures to maintain high reliability





# User experience

# User experience – many factors

SLA

Reliability

Latency

Bandwidth

Security

Certifications: ISO 27001, SAS 70 Type II, SSAE 16, FISMA

Privacy

Support, etc.

# Approach

QoS used internally but not expected end to end

CDNs

Over capacity

Software built to adapt to network conditions

Example: Microsoft Lync (has a QoE module)

# Net neutrality debate

# High-capacity Internet access

Needed by governments, businesses and citizens

To tap into the potential of the Internet and Cloud Computing

## National Competitiveness

Access to Internet content, apps and services generates economic and social opportunity, fosters innovation, market development and job creation (especially with SMEs) and ultimately national competitiveness\*

A powerful societal and economic differentiator, redefining where people and nations fall on the "Digital Divide"

\* The Internet now accounts for 21% of GDP growth in the last 5 years in mature countries (McKinsey Global Institute: Internet Matters, May 2011).

# Net neutrality debate

## Too important to polarize

Not an irreconcilable choice between promoting an open Internet for consumers or ceding control to broadband infrastructure owners and operators

## A balanced approach is required

To enable end-users to access the Internet and use the devices and services/applications they choose (the net neutrality / open Internet principle) while also ensuring that the network operators continue to have the sufficient economic incentive to continue investing in their networks, thereby improving and enhancing the availability of broadband Internet service

Strategic opportunity for governments to reach remote areas and underserved populations

Online services providers depend upon the Internet to reach consumers and citizens. New and innovative services have and will continue to spring from the global access the Internet provides, benefiting consumers and generating entirely new industries.

# Balanced approach

## Digital Inclusion

Remember that 5 billion people – out of a worldwide population of 7 billion – still lack access to computers or the Internet

Strategic opportunity for governments to reach remote areas and underserved populations

## Allow creation of new industries

Online services providers depend upon the Internet to reach consumers and citizens. New and innovative services have and will continue to spring from the global access the Internet provides, benefiting consumers and generating entirely new industries.

## Let network operators be profitable / flourish

There is a genuine need for those entities that provide the broadband infrastructure that powers the Internet globally to manage their networks, innovate, and to conduct viable and growing business. It is essential that these companies, often strong contributors to local economies, can operate in a predictable marketplace.

# Broadband development

## Network operators

Allow Network Operators to have the appropriate incentives to reinvest in their networks and continue to deploy broadband and offer service enhancements and tiers of service, either to consumers or to online service providers. However, such flexibility must be accompanied by a prohibition on Network Operator discrimination that is anticompetitive or harms consumers.

## Spectrum policies

Rational and forward-looking spectrum policies that encourage the deployment of wireless broadband, including:

- Making more spectrum available for both licensed and unlicensed uses.
- Making more spectrum below 1 GHz (i.e., the vacant channels in the TV spectrum band – the TV “white spaces”) available for unlicensed broadband services.
- Encouraging innovative use of spectrum, e.g., software defined radios and cognitive radio systems.
- Connecting anchor institutions such as schools, libraries and healthcare facilities to high capacity broadband connections.



# Conclusion

# With respect to “net neutrality” principles, Microsoft supports governmental policies that

- Ensure the ability of consumers to use the lawful content, applications and services of their choice on the Internet, to connect and use any lawful device that does not harm the network and to obtain meaningful information about their service.
- Prohibit discrimination by broadband providers that is anticompetitive or harms consumers and innovation.
- Allow network operators to offer service enhancements and tiers of service, either to consumers or to online service providers.
- Create an expert and efficient enforcement mechanism that addresses discrimination issues as they arise.

# ***Microsoft***<sup>®</sup>