THE RISE OF EDGE AND HYPERSCALE DATACENTERS

BROADGROUP

INTRODUCTION

- Why Cloud and Edge will be the dominant technologies over the next few decades and Edge the most profound and extensive change for decades to come
- Where it is happening now
- How and when it will be implemented
- Outlook for Edge in Asia

RISE OF EDGE AND HYPERSCALE

At present two forms of critical development taking place in datacenters:

Hyperscales in locations important to regional content distribution – around 340 already built or being planned and developed globally

Edge in Tier 2/Tier 3 cities where new eco systems generating massive data and also cached or stored data/content can be processed and or distributed

Early development particularly in the US but significant deployment likely over next 2 – 5 years globally

DATA EXPLOSION

Several factors converging

1 - Growth in internet penetration along with ubiquity of mobile and hand held devices

2 - Explosion of human generated data, primarily unstructured, and machine-generated information at the digital edge

3 - Cloud has emerged as a singular computing paradigm of this century

4 - Promise of an ultra-low latency 5G network with sub 10ms latency built for the Cloud

5- Critical need for datacenter-based applications to support frequent point of contact with customers at the digital edge – delivering digital experiences and business exchanges

6 – Huge costs to transmit content over long - cache popular content locally

7 - Extend the internet to Edge cities where content is cached – deployment edge & micro datacenters

EMERGENCE OF EDGE

Possibly the most important technological innovation and development in a generation

Brings together a host of other new technologies, services and applications

At its core will be the deployment of 5G + IOT + networks of sensors + Edge datacentres

Multiple deployment of Edge datacentres across second and third tier cities in most developed countries by 2025

Possibly spawn new types of service market player who are able to integrate everything-as-a-service

EMERGENCE OF EDGE

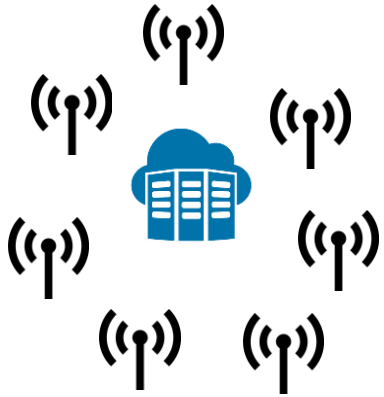
“Edge is infinitely flexible and constantly moving the demarcation between service and the consumer.”

“5G will change everything, with huge bandwidth and channels requiring potentially millions of antennas.”

“….disaggregation of traditional IT servers taking place, with the separation of compute processing, networks and storage components, being placed on IoT devices, gateways or in roadside cabinets.”

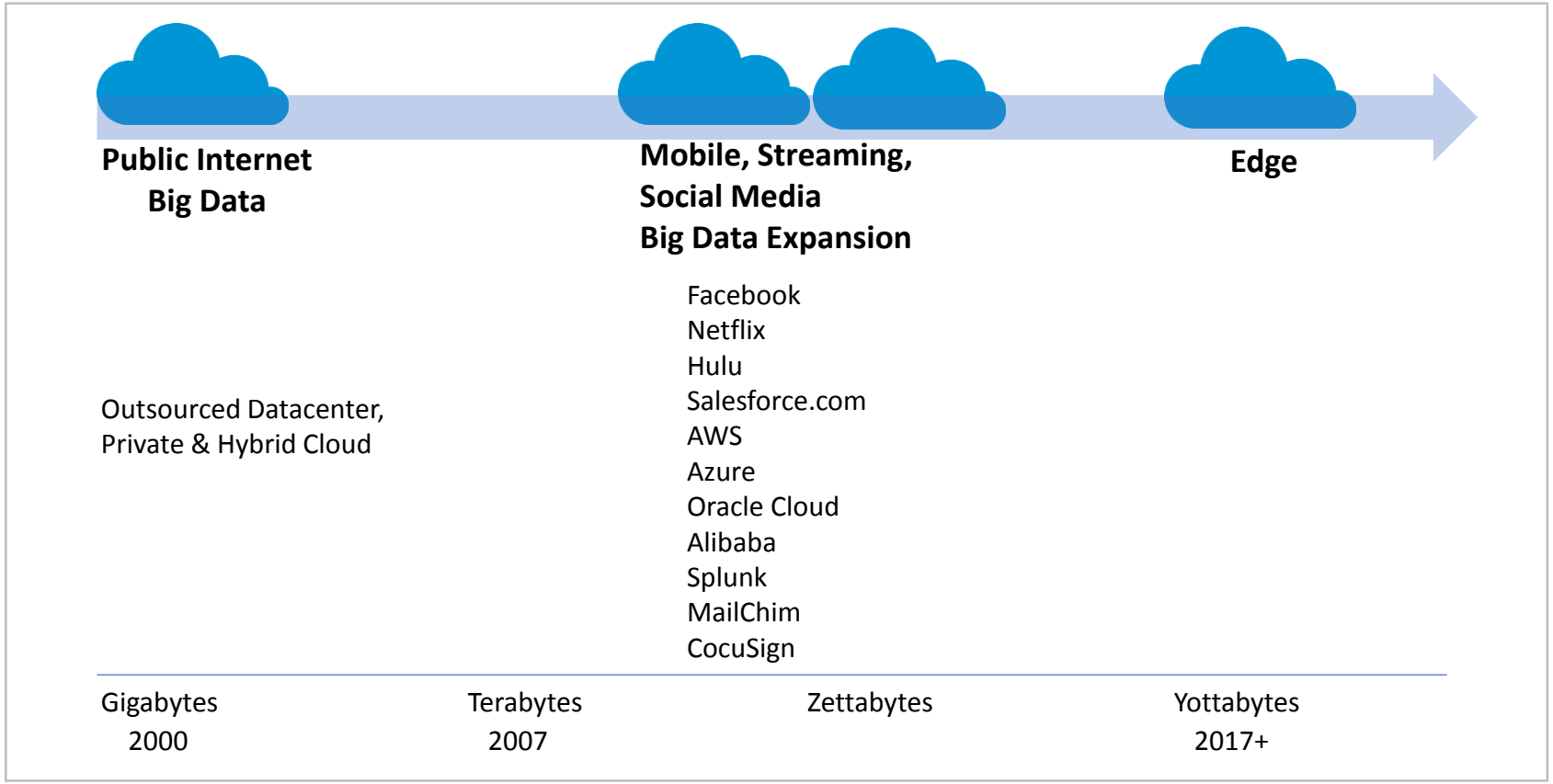
(from new Edge report by BroadGroup)

Macro drivers – Internet Access

Metropolitan City Access	Regional	Community & Smart City
Content Cache & Network Peering	Hyperscale Cloud Node	Microcell 5G & CBRS (Citizens Broadband Radio System)
		
2-8MW	20-60MW	2-5 Amps 1000’s

MACRO DRIVERS

We are moving towards the age of Yottabyte – the so called "fourth transformation"
We create 2.5 quintillion* bytes of data every day (*that's 18 zeros)



DATA AND DIGITAL TRANSFORMATION

We have performed more data processing in the past 2 years than in the past 2,000

EVERY SECOND TODAY

7.7k tweets posted

71k Youtube videos viewed

8.5k comments posted to FB

2.3k photos uploaded to FB

2.8k Skype calls placed

804 photos uploaded to Instagram

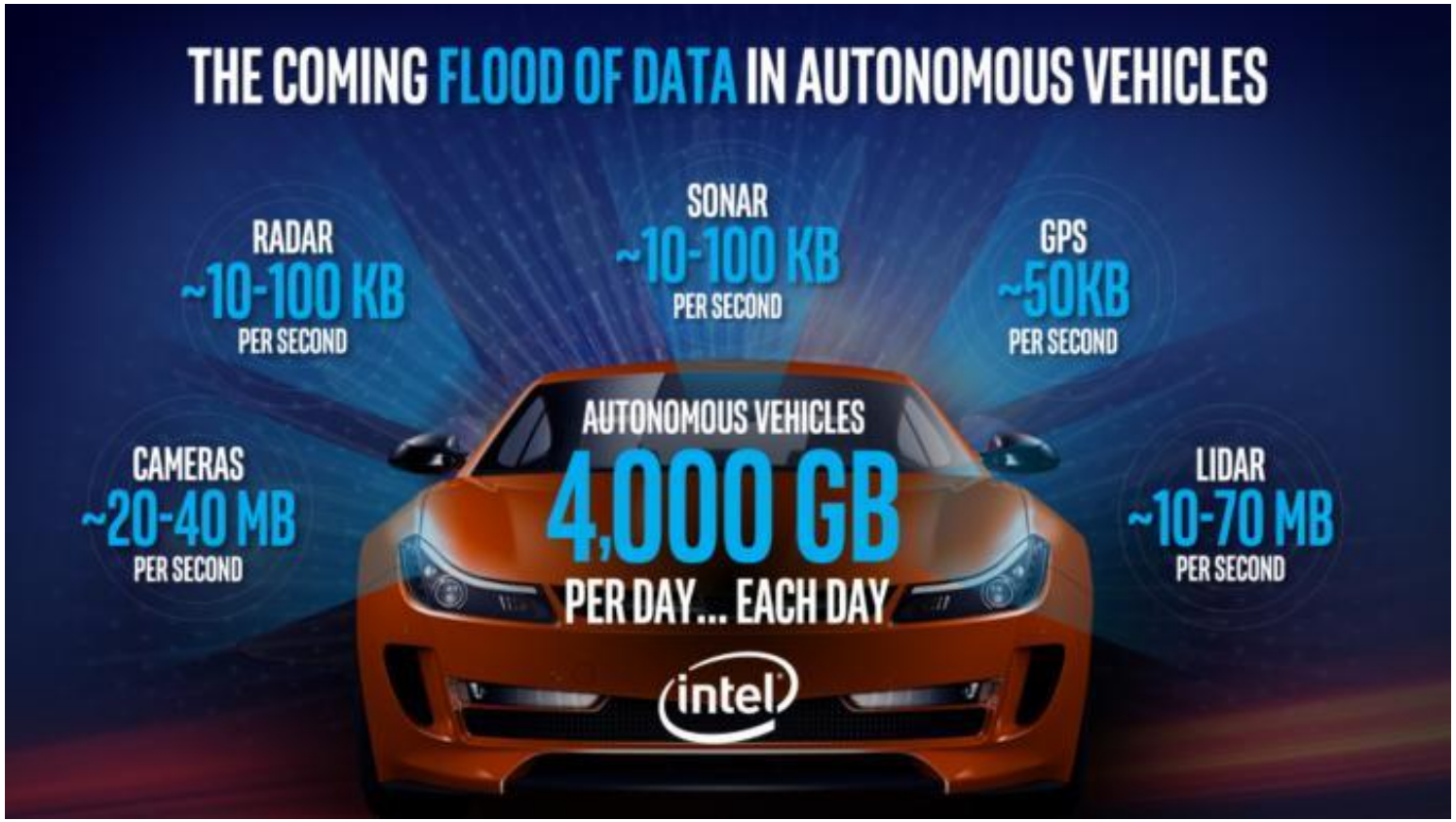
63k Google searches performed

2.6m emails sent

48.7GB internet traffic passed

FUTURE DATA AND DIGITAL TRANSFORMATION

Data generated by autonomous cars, road traffic systems will be exponential



Some critical functions such as braking and steering will be processed by very powerful blade servers in the cars

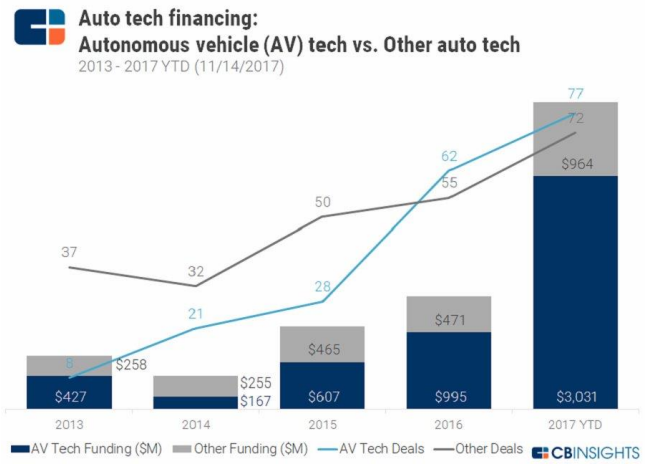
Cars need Real time analytics

40 terabytes of data for every eight hours of driving (Intel)

Audi - 35-mph hands-free driving system available late next year in some 2018 vehicles

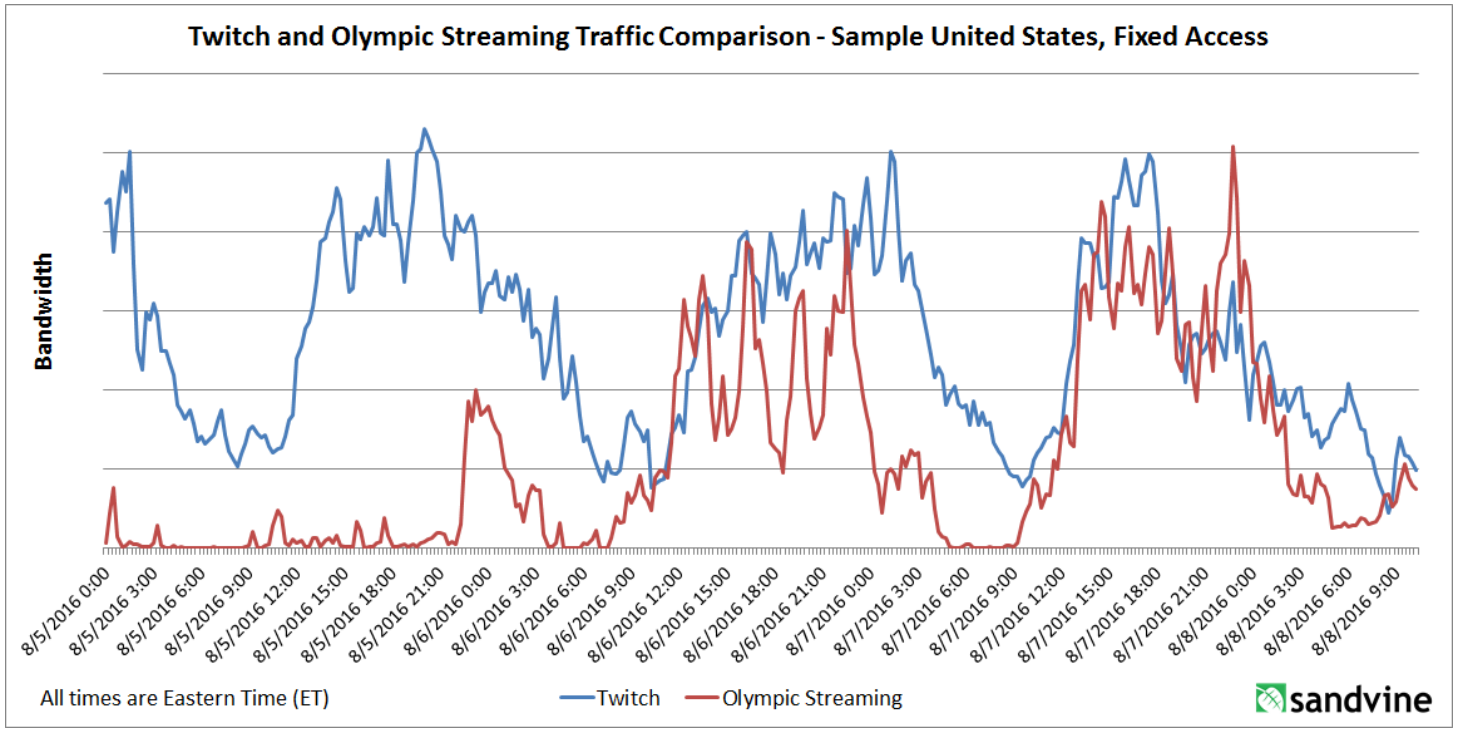
Volvo will begin testing DriveMe + in-car entertainment

Typical American commuter spends 250 hours per year in car



DATA ALREADY CHANGING

Internet Traffic is changing: Streaming eSports growth of 65% in 2016



Twitch is the leading Streaming provider for eSports and Live Streamed Events (concerts etc..)

In 2016, Twitch generated more traffic than HBOGO

On August 23rd, Twitch announced that they had set a new viewership milestone, boasting more than two million concurrent viewers.

Driven by two major eSports events: ESL One: Cologne the world's biggest Counter Strike: GO tournament, and

League of Legends Summer Playoffs.

Twitch reaches its peak during the late morning/early afternoon and **accounts for over 4% of total global network traffic.**

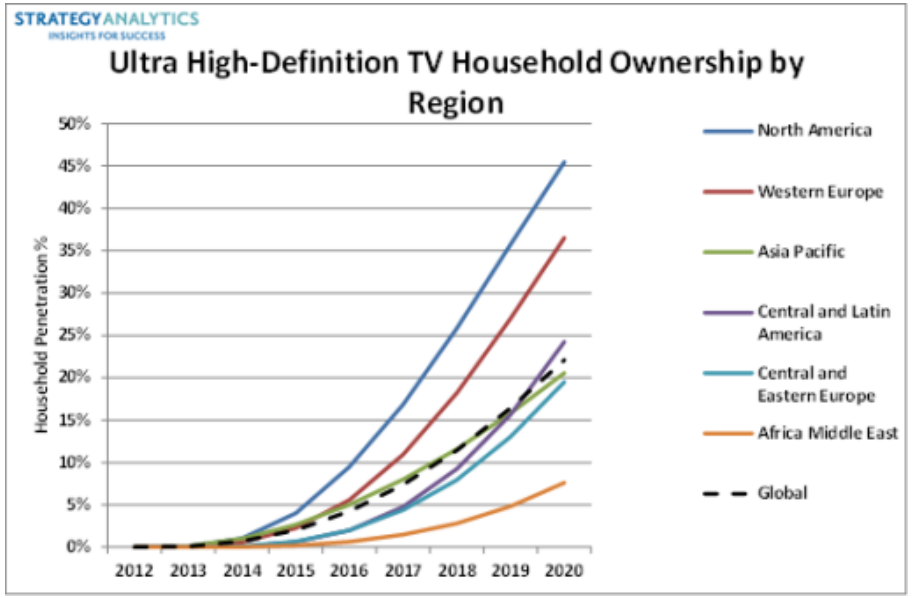
DATA CONTINUING TO CHANGE

UHD TV – with arrival of 4K TVs

Based on a resolution of 3840 x 2160 pixels, is 4x the number of pixels at HDTV resolution: 4K standard (By 2020 possible UHD standard 7680 x 4320 pixels)

Consumer demand – Viewers increasingly expect a TV-like experience from internet streaming

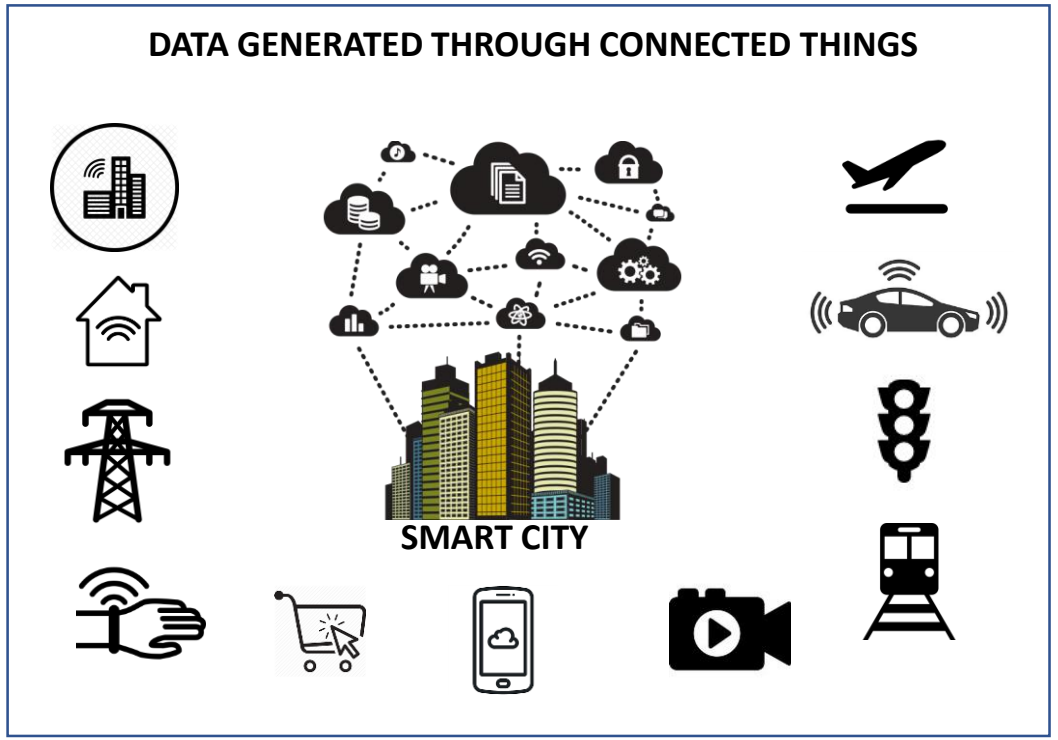
UHD TV installed base in Europe will more than triple from 2017 to 2021 - by 2019 some 35% of European households will have 4K TVs



DATA AND DIGITAL TRANSFORMATION

Data explosion in Tier 2, 3 cities requires local processing

Global data traffic set to reach **71 billion GB** per month by 2022



Network congestion drives need for datacenter capacity and new form factors

	2015	2020	
Internet Users	3.0B	4.1B	
Connected Devices	16.3B	26.3B	→ 50B by 2025
Video Viewing	0.7ZB	1.9ZB	→ Video 75% of mobile traffic by 2021
IoT Spending	$625B	$1.3T	

Source: EdgeConneX/Cisco/TBR/IDC

Networks need to manage Next Gen Workloads

Next Generation Workloads

- Next Gen workloads such as augmented reality/virtual reality (AR/VR), drone footage, and autonomous cars will require massive near-real time computation

- Only a matter of time before AR/VR experiences will be delivered on mobile phones

- If workloads can be processed close by at Edge facilities, the user experience will be dramatically better

WHERE ITS HAPPENING NOW

EdgeConneX deployed ….. Edge datacenters

27 edge facilities in USA

3 in Europe

Under construction in France, Italy and Austria, Chile and Argentina

Used by content providers like Google and Netflix their traffic picked up by last-mile ISPs who take it to their end users

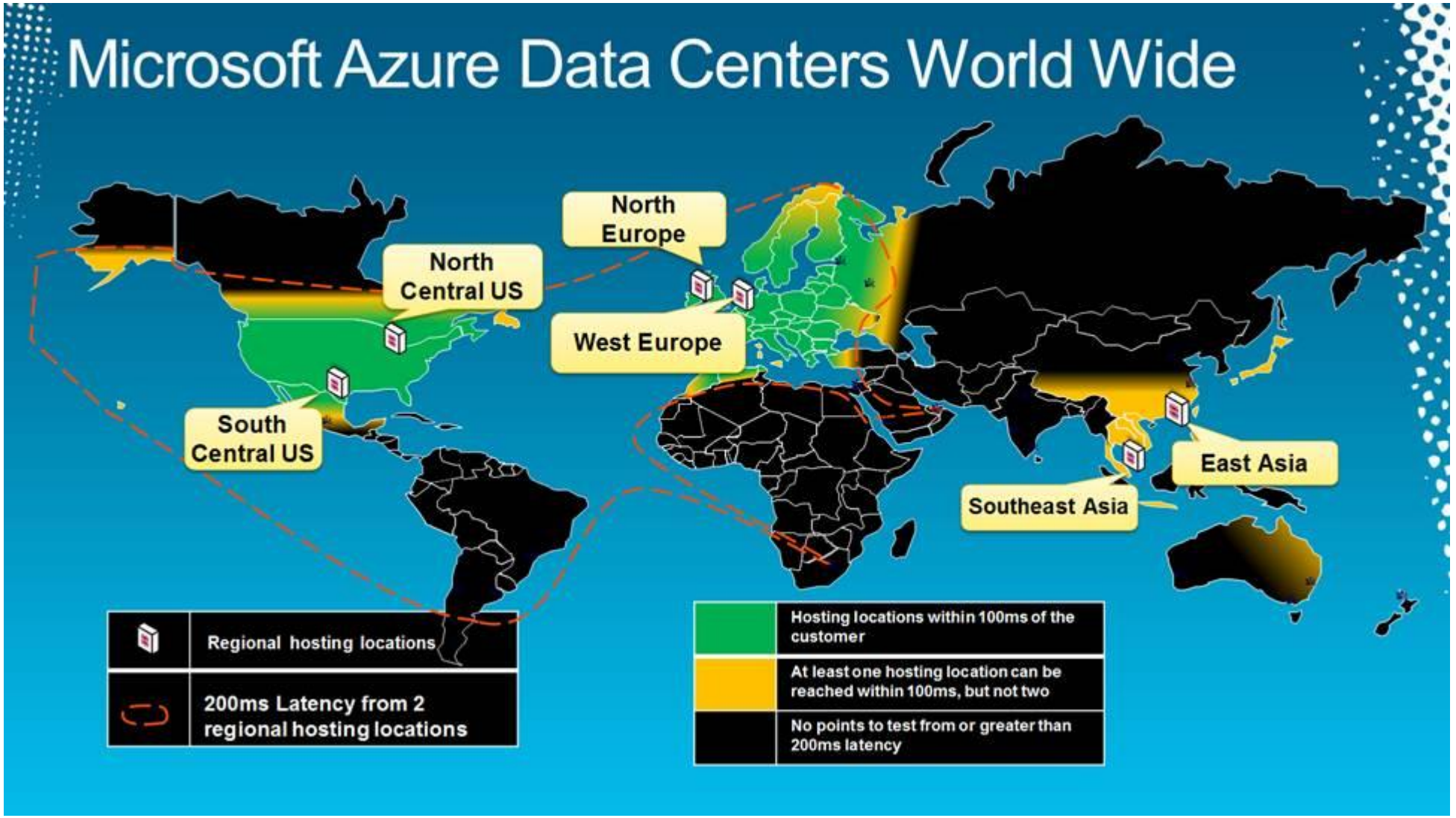
WHERE ITS HAPPENING NOW

365 datacenters in 10 Tier 1 and Tier 2 markets

Boca Raton, FL
Buffalo, NY
Chicago, IL
Detroit, MI
Fort Lauderdale, FL
Indianapolis, IN
Nashville, TN
New York, NY
Philadelphia, PA
Tampa, FL

Focused on edge colocation services, providing space for servers that cache content in secondary markets
Content providers save cost of backhauling it from far-away hubs

Microsoft Azure – moving closer to customers



WHERE ITS HAPPENING NOW

Digital Bridge (Databank & Vertical Bridge) deploying network of microdatacenters in the base of mobile towers

digital bridge

MTP Mexico Tower Partners	atp ANDEAN TOWER PARTNERS	extenet SYSTEMS	VANTAGE DATA CENTERS	vertical bridge
Mobile towers in Mexico	Mobile towers in central America	Neutral host for wireless service providers	6 wholesale datacenters In Silicon Valley and Quincy WA	Wireless telecoms infrastructure

WHERE ITS HAPPENING NOW – TELCO OPPORTUNITY

AT&T
Planning to use its central offices, cell towers to house its future edge datacenter network
Prepares for the roll-out of 5G wireless
Aims to virtualize 75 percent of its network functions by 2020

CROWN CASTLE/VAPOR IO/INTEL
“Project Volutus”
Network of microdatacenters across mobile tower installations in US connected by dense metro fiber network
Vapor IO Hardware and Software
By-passes multi-hop high-latency backhaul

NTT Communications
Partnership with Toyota to research and build a global network of datacenters for Internet of Things applications

WHERE ELSE ITS HAPPENING NOW – MICRO DATACENTER DEPLOYMENT

Localization of Data

- Data provides competitive advantage to enterprises
- Most data is stored locally in server closets and rooms of branch offices and forwarded to the core datacenter or a cloud for analytics to save storage and bandwidth costs
- Larger companies investing in faster data analysis and real time decision making in a distributed infrastructure by bringing artificial intelligence to these Edge nodes

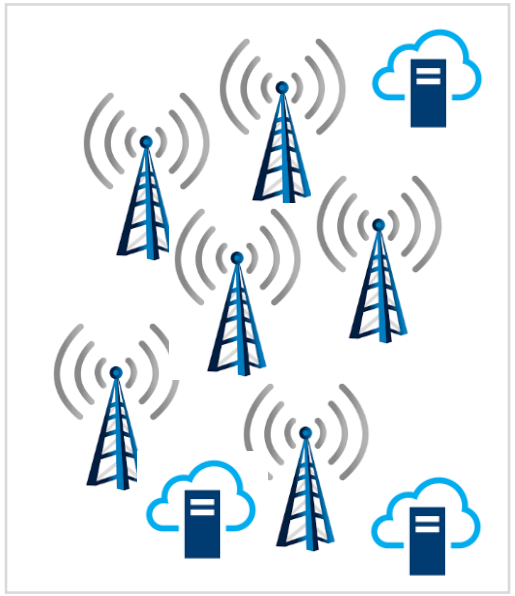
TELCO CENTRAL OFFICE
Deployment of edge nodes in telco central offices
Tend to be higher-density
2kW or 3kW per cabinet – most: single cabinets
Does not require dedicated cooling capacity

RETAIL OUTLETS / MANUFACTURING FACILITIES
Growing use big data analytics
Security big driver of compute capacity in store – eg surveillance
Edge data center power 3kW to 6kW, but can be 8kW to 10kW
Total capacity per site ranges from 40kW to 80kW

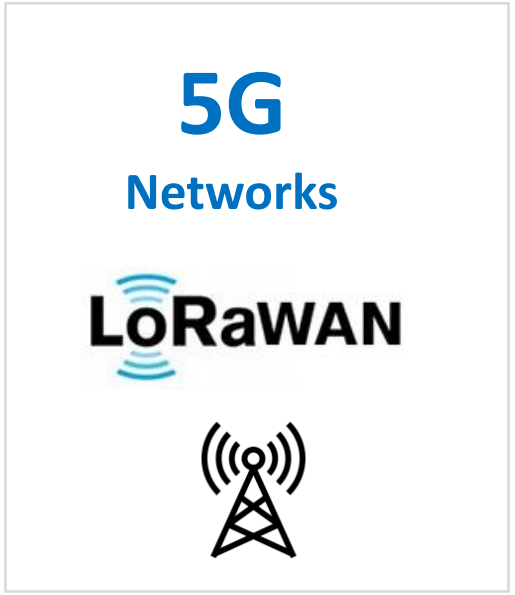
DISTRIBUTION WAREHOUSES
Also moving closer to customers
Compute power to manage transactions, inventory, and shipping data
Power densities 6kW to 8kW

INFRASTRUCTURE IMPLICATIONS – RISE OF EDGE

Infrastructure supporting Edge will be need to be extensive to manage data generated through connected things

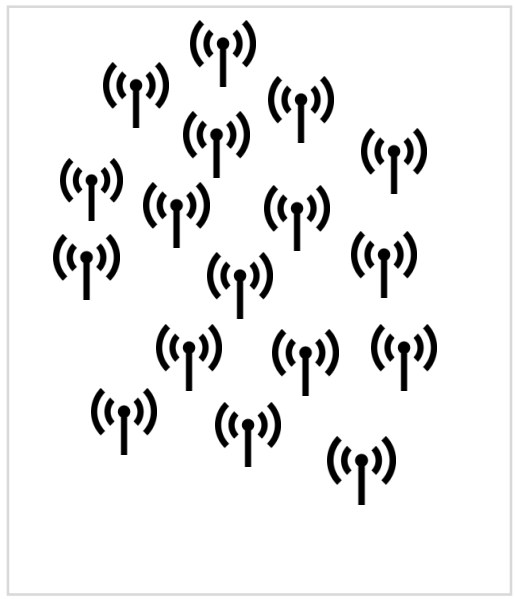


Mobile Towers, Fiber Networks & micro datacenters

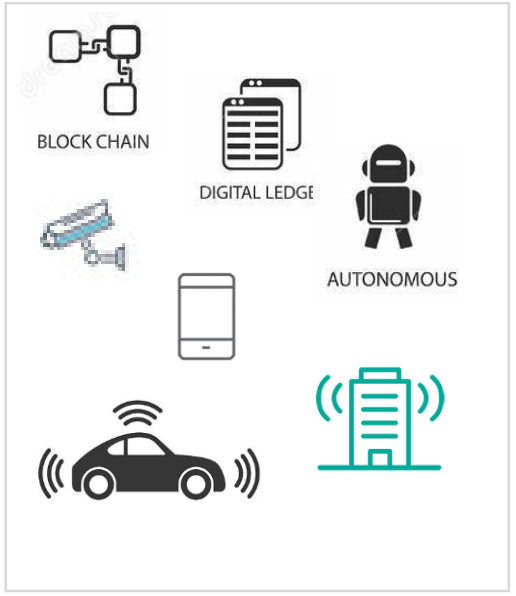


Networks including Long Range Low-power WANs + Big Data Analytics & Machine Learning to cache and predict user traffic

Fixed fiber network assets achieve higher valuations



Billions of sensors – in/on people, places, things – Sensors are gateway which aggregate data and connect to the internet or WAN for transit



Edge devices will include blockchain applications, IoT devices and telemetry from autonomous cars

INFRASTRUCTURE IMPLICATIONS – RISE OF EDGE

Edge Environments

Edge nodes/datacenters can be used to reduce backhaul bandwidth and latency involved in data transit to the Cloud

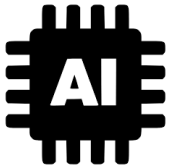
REGIONAL EDGE

Critical load of approximately 1 MW or higher
Located in Tier 2 or Tier 3 cities

LOCAL

Critical load of approximately 350 kW
Custom built/prefabricated

LOCAL DEVICES AT EXTREME EDGE



+AI for data collection, interpretation and action, prioritize data traffic

INFRASTRUCTURE IMPLICATIONS – RISE OF EDGE

Implications for the Enterprise

Interconnect

How to interconnect increasingly dispersed pools of in-house and third party– provided IT, apps and data resources to enable digital platform strategies built on cloud and data analytics

Shift to Distributed architecture

Shift IT delivery architecture from siloed and centralized to distributed, colocated, and interconnected

Infrastructure dependencies: 5G

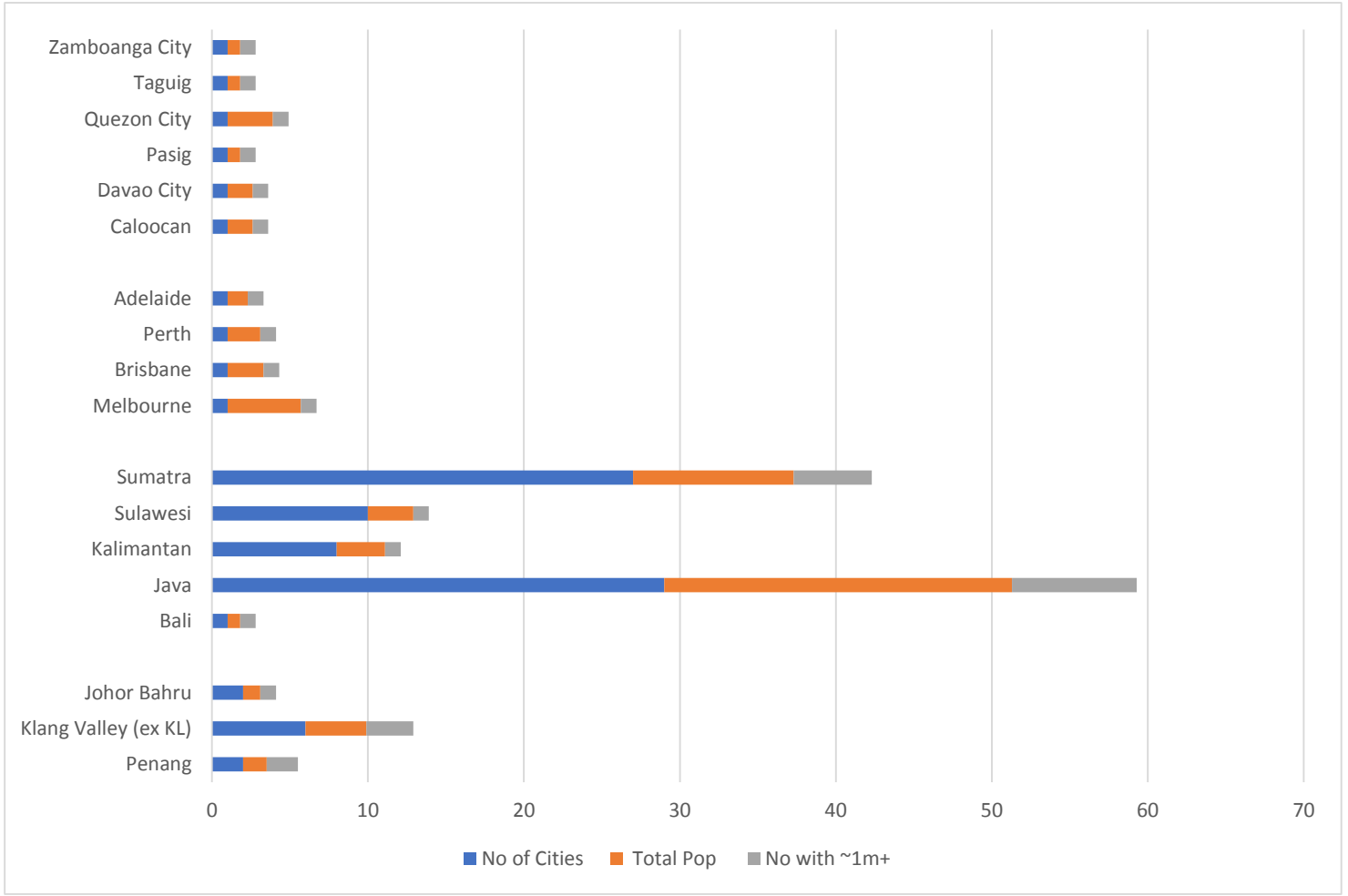
5G Network: expected roll out globally 2020*

Speeds increase from 1Gbps (4G) to 10Gbps
Virtualized radio access network (vRAN)
Flexibility, scalability, lower cost
Mobile Edge computing (MEC)
Enables data analytics at point of use

Low-latency New Services
Augment reality/virtual reality
IoT
Public-safety
Industry-critical services (robotics)
Mission-critical (healthcare)

*Samsung believes it could be sooner – h/w ready by 2019

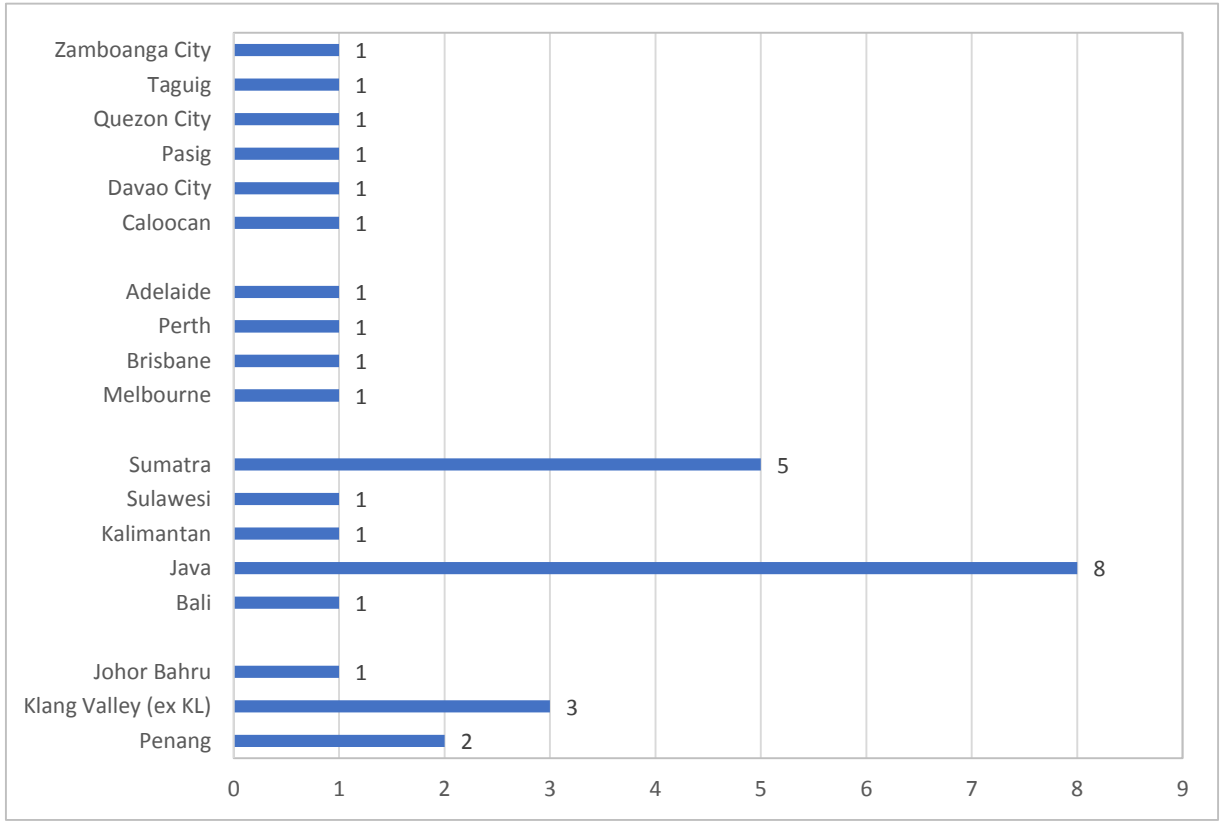
Addressing data generated in population centers outside capital cities – Philippines, Australia, Indonesia, Malaysia



Source: BroadGroup

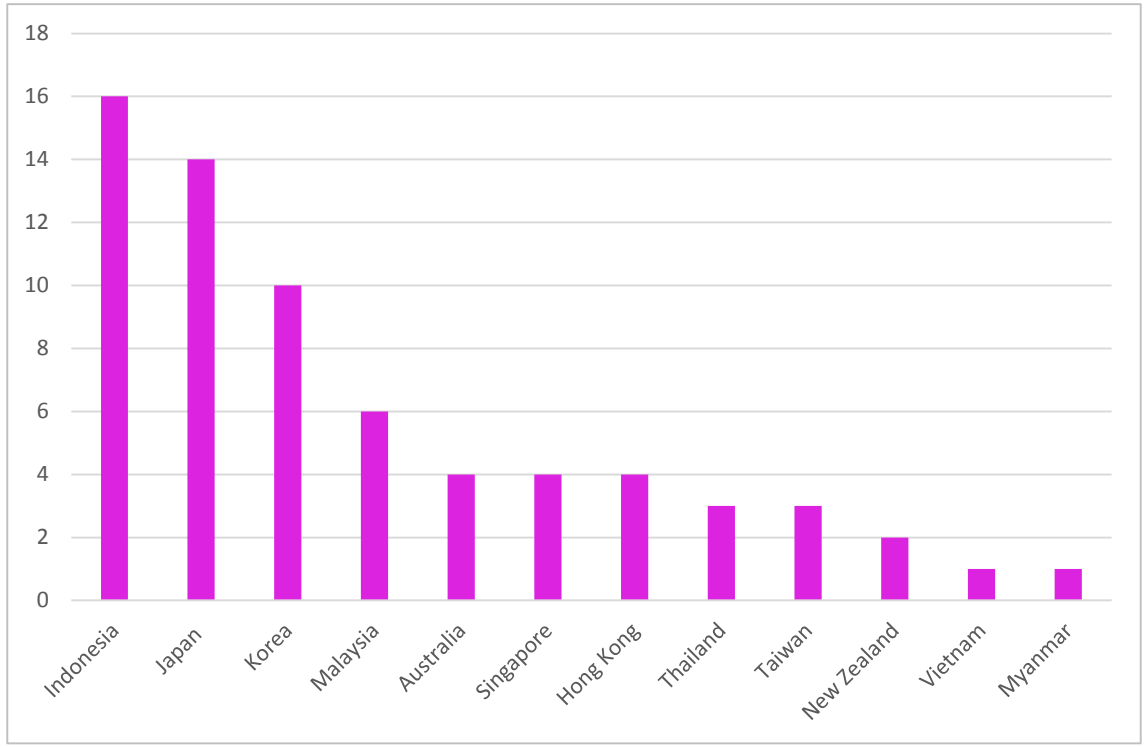
EDGE

Edge datacenters outside capital cities – Example: Philippines, Australia, Indonesia, Malaysia – 32 new edge facilities under this Example; BroadGroup Forecast is between 5 and 10 per country over next 3-5 years



Source: BroadGroup

Edge datacenters outside capital cities – Asia Forecast excluding China – 68 edge facilities across 12 countries based on cities with approximately 1m+ population



Source: BroadGroup

FINALLY….

Please remember to include in your event calendar for 2018

And enter for the AWARDS – www.datacloudasia.com

THANK YOU

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