

Skyer og Tåge

Presenter

- ✓ Stig Ridler, Former IBM Consultant and IBM Quantum Ambassador

The Network is the Computer

- ✓ How it all began - Packet switching, ARPANET - The origin of the Internet
- ✓ The Internet protocol suite - From NCP to TCP/IP, The protocol stacks - The TCP/IP and OSI models
- ✓ The breakthrough - Email, WWW and the first browsers

Cloud Computing

- ✓ What is Cloud, Fog and Edge computing
- ✓ Cloud service providers - for businesses
- ✓ Virtualization - containers - kubernetes
- ✓ Cloud storage – for the consumer market
- ✓ Cloud security - Clouds are not bulletproof

Internet of Things (IoT)

- ✓ Devices @ Home - Cloud connected
- ✓ Devices @ Home - Not using cloud



How it all began

Packet switching (1960, 1964, 1965)



SAGE (Semi-Automatic Ground Environment)



Paul Baran

Donald Davies



Leonard Kleinrock

ARPANET

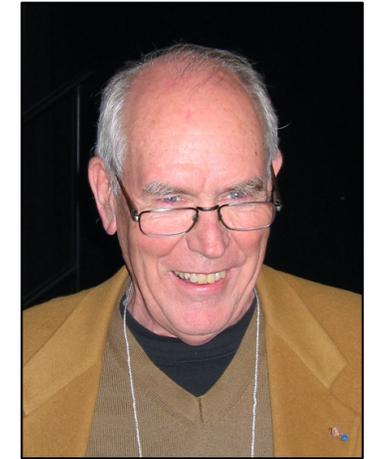
The origin of the Internet (1963, 1966, 1969)



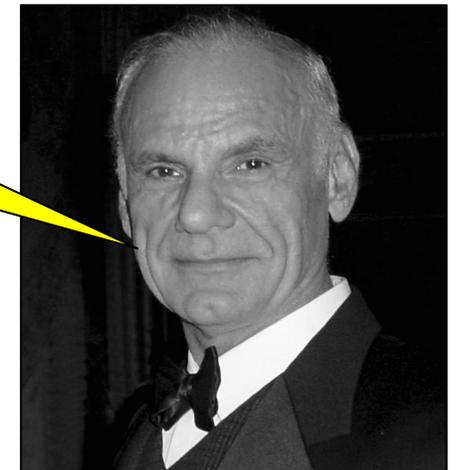
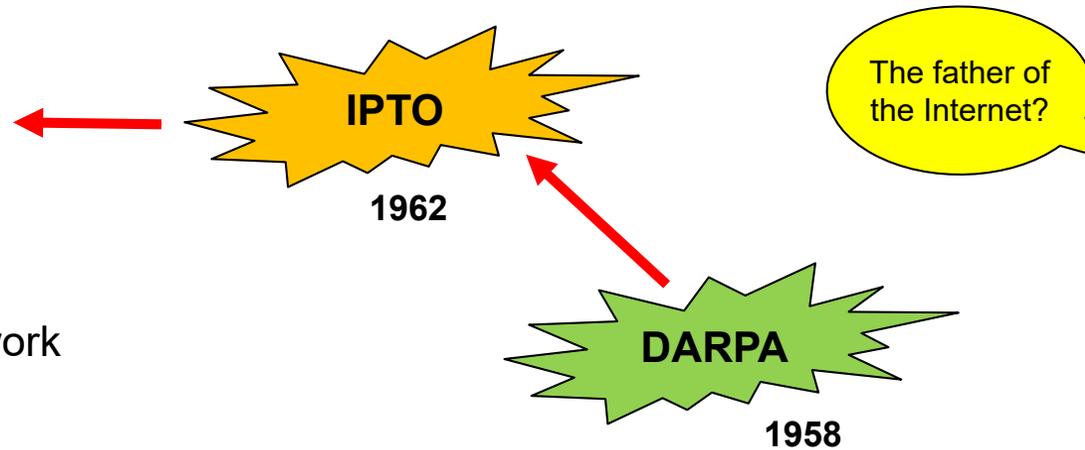
JCR Licklider - The Galactic Network



Robert Taylor



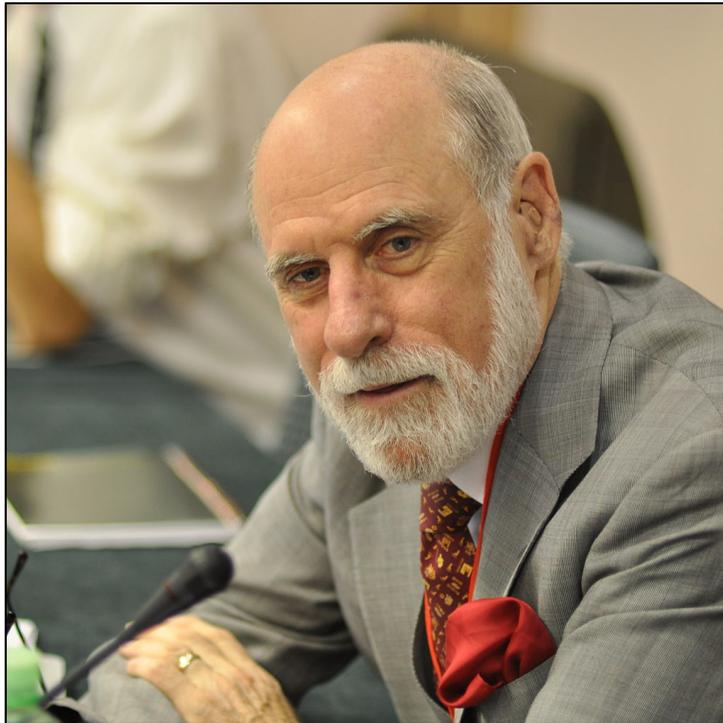
Ivan Sutherland



Lawrence Roberts

The Internet protocol suite

From NCP to TCP/IP



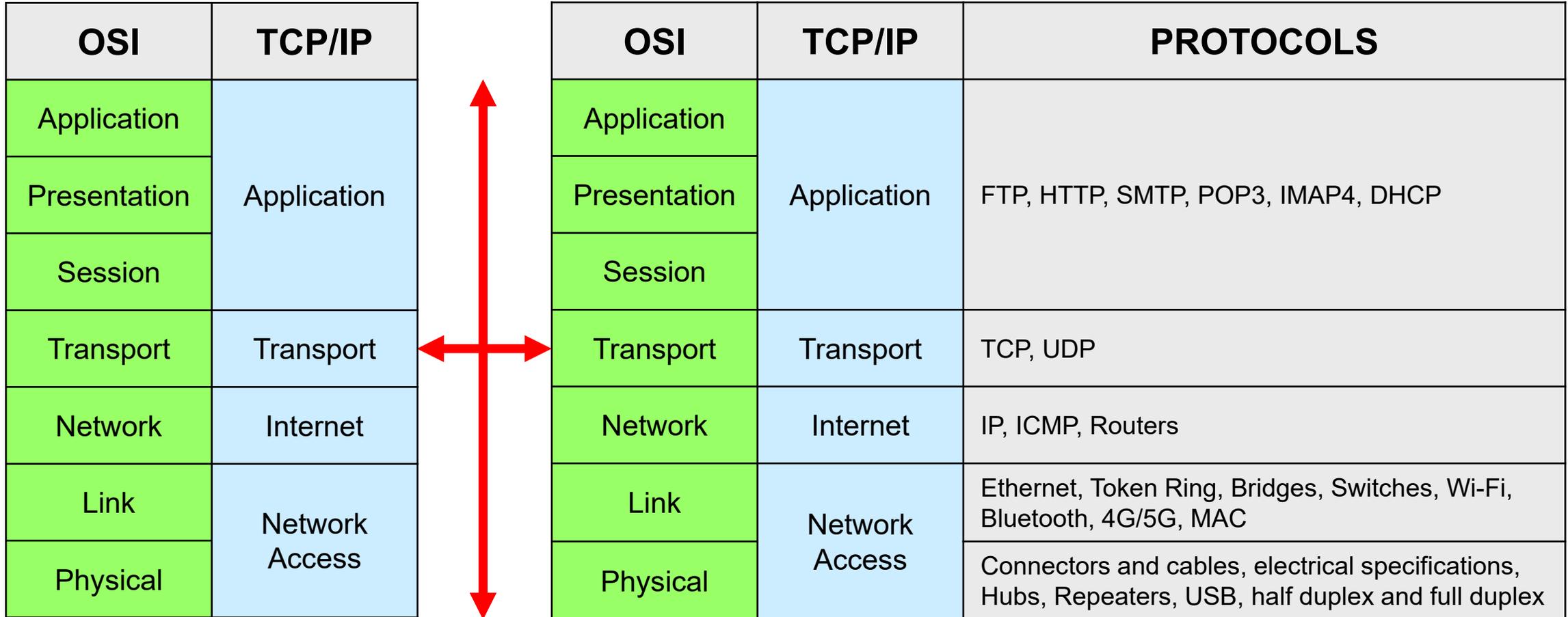
Vint Cerf



Robert Kahn

The protocol stacks

The TCP/IP and OSI models

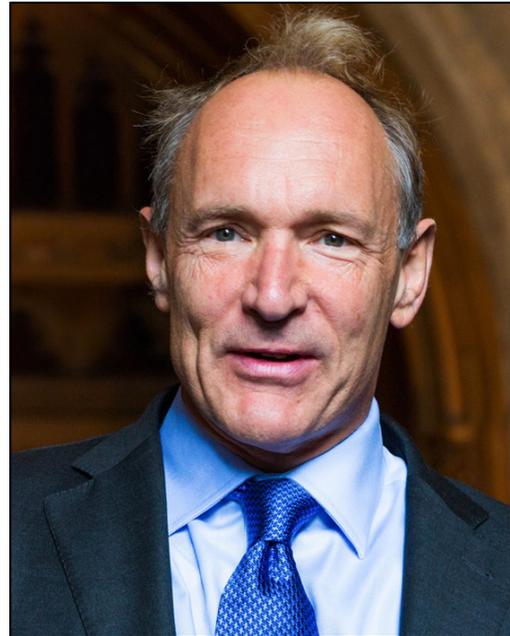


The breakthrough

Email, World Wide Web and the first browsers (1971, 1989, 1993)



Ray Tomlinson (@)



Tim Berners-Lee ([HTTP](#), HTML)



Marc Andreessen (Mosaic, Netscape)

Pei-Yuan Wei (ViolaWWW, 1992)

What is Cloud Computing

Cloud computing is the delivery of hosted services like servers, storage, databases, and software over the Internet, the cloud. It offers faster innovation, flexible resources, and economies of scale. Clouds typically use a pay-per-use model, which helps to lower the operating costs, runs the infrastructure more efficiently, and scales as the business needs change.

There are **4 main types of cloud computing**:

- ✓ **Public** clouds are cloud environments that are created from an IT infrastructure not owned by the client and located remotely
- ✓ Clouds become **private** when the underlying IT infrastructure is dedicated to a single customer with completely isolated access
- ✓ The definition of **hybrid** clouds is complex and the requirements depend on whom you ask. A hybrid cloud may include at least one private cloud and at least one public cloud, two or more private clouds, two or more public clouds. a bare-metal or virtual environment connected to at least one public cloud or private cloud
- ✓ **Multiclouds** are an approach made up by more than 1 cloud service, from more than 1 cloud vendor - public or private

There are **3 main types of cloud services**:

- ✓ Infrastructure as a Service (**IaaS**) contains the basic building blocks for cloud computing. It typically provides access to networking facilities, computer hardware and storage
- ✓ Platform as a Service (**PaaS**) removes the needs for managing the underlying infrastructure (usually hardware and operating systems). It also allows software developers to focus on the deployment and management of the applications
- ✓ Software as a Service (**SaaS**) provides complete software products that is run and managed by the service provider. In most cases, when people refer to SaaS they mean end-user applications like web-based email, Office and ERP

What is Fog and Edge computing

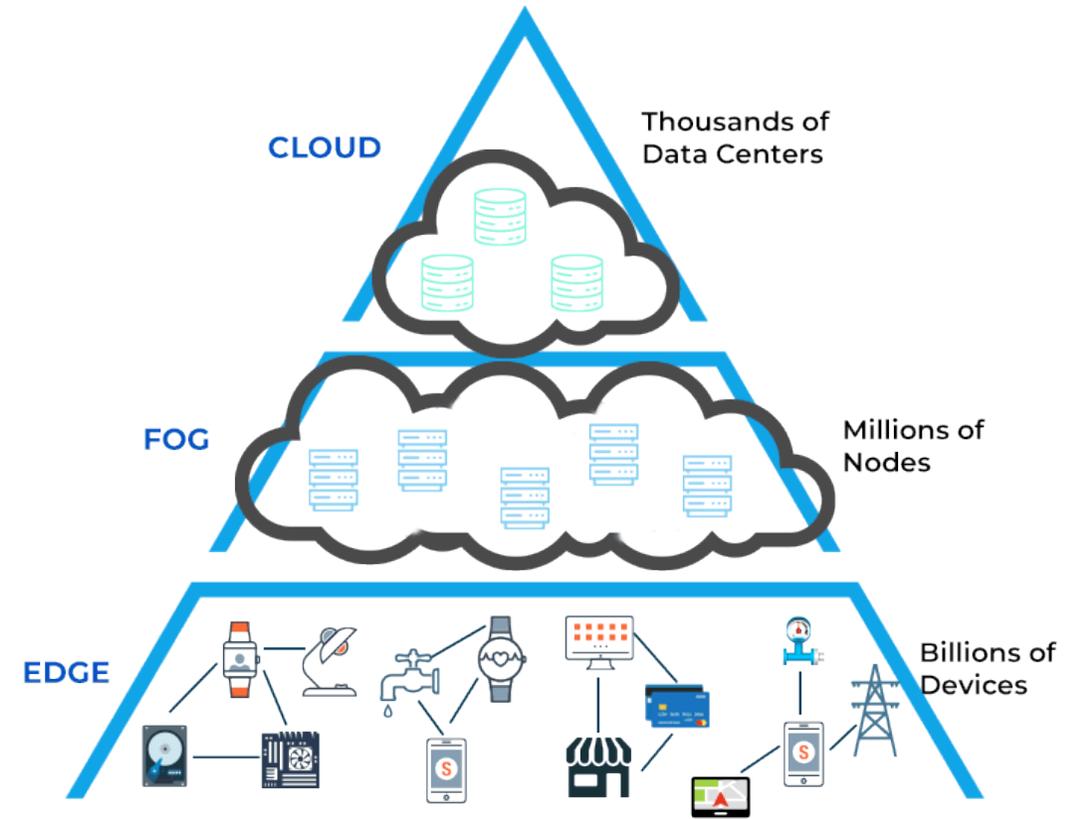
Fog computing means that there is a compute layer between the cloud and the edge.

While the edge layer might send huge streams of data directly to the cloud, the fog layer can receive the data from the edge layer before it reaches the cloud and then decide what is relevant and what isn't.

The relevant data gets stored in the cloud, while the irrelevant data are deleted, or analyzed at the fog layer.

Many people use the terms fog computing and edge computing interchangeably as both mean getting information and processing closer to the location of the data.

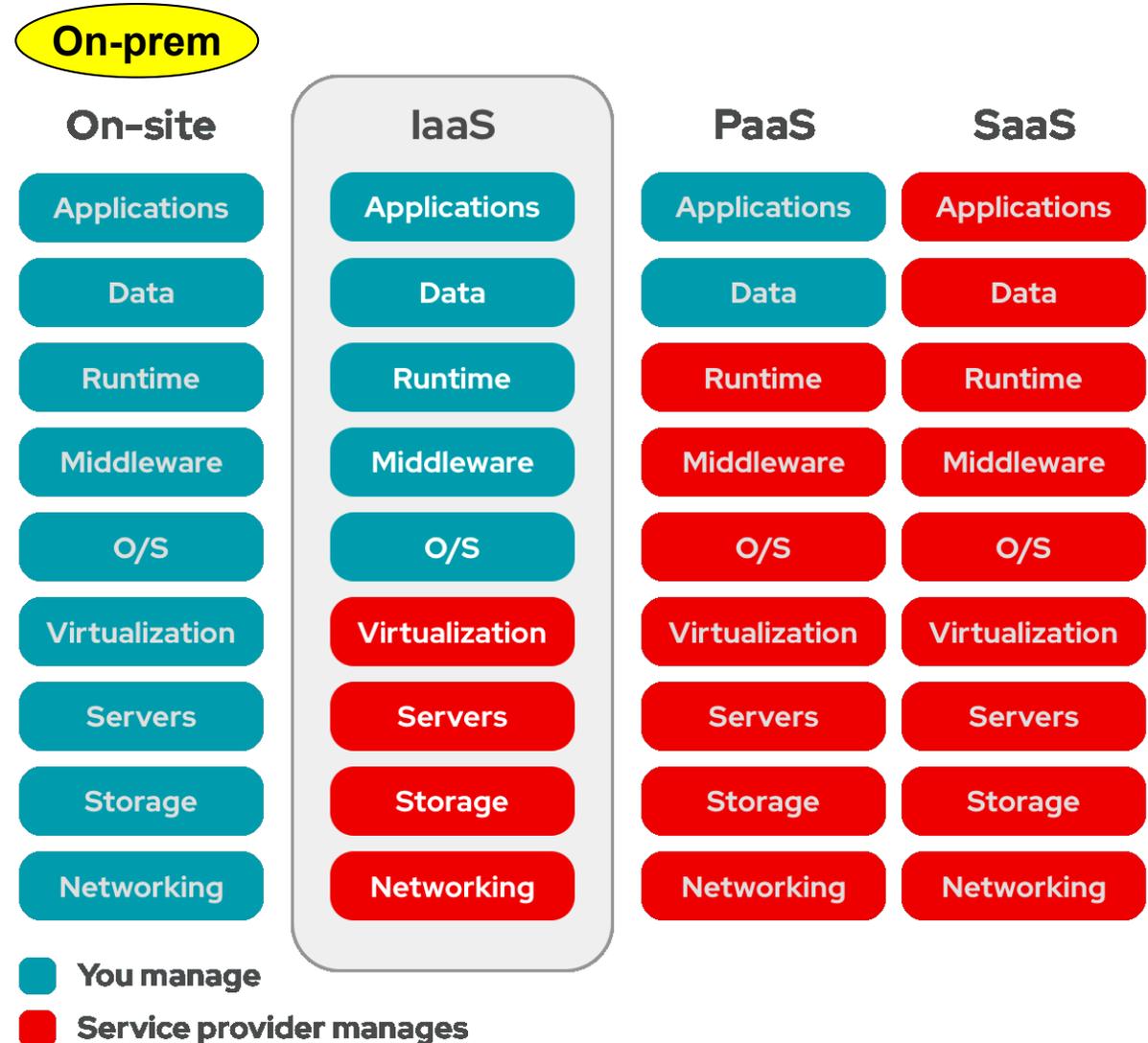
Fog computing is commonly used for IoT deployments. The emergence of 5G networks, which promise to deliver ubiquitous, high-speed, wireless connectivity, should accelerate the deployment of fog computing systems.



Cloud service providers for businesses

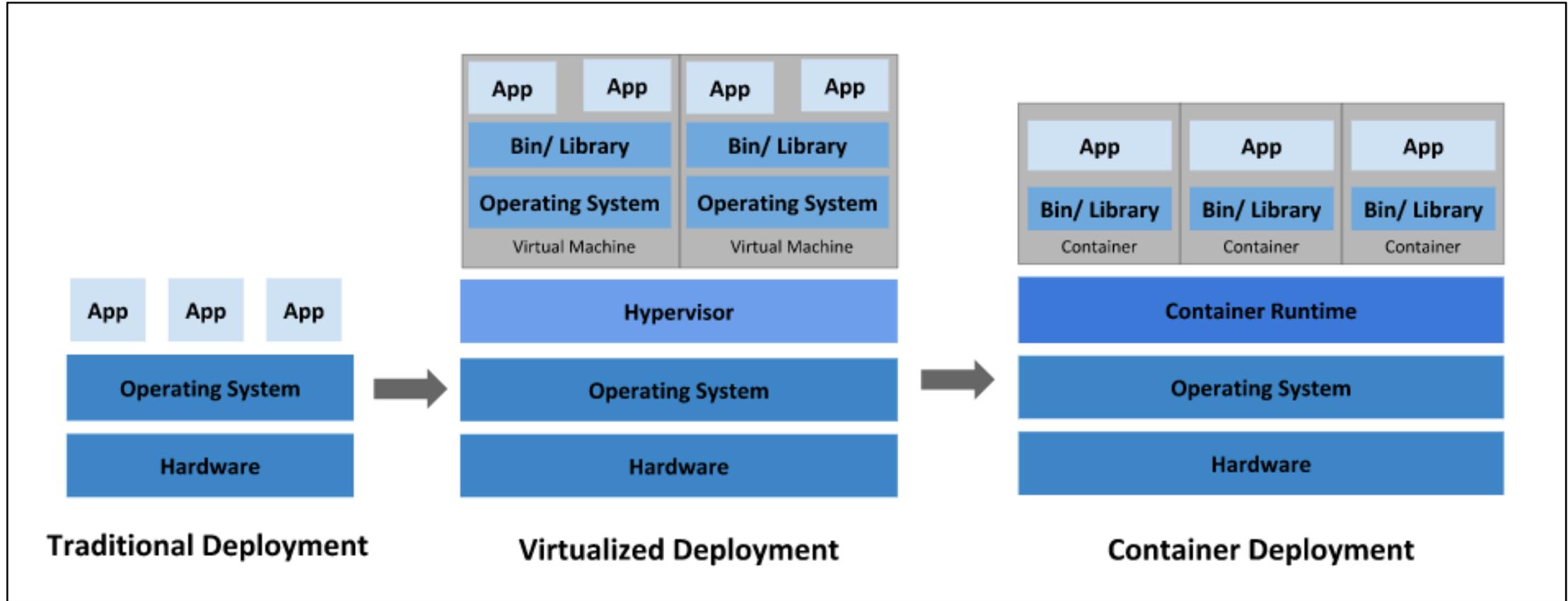
- ✓ Amazon Web Services (AWS)
- ✓ Microsoft Azure
- ✓ Google Cloud Platform (GCP)
- ✓ Alibaba Cloud
- ✓ Oracle Cloud
- ✓ IBM Cloud (Kyndryl)
- ✓ Tencent Cloud
- ✓ OVHcloud
- ✓ DigitalOcean
- ✓ Linode

Global cloud market estimate: 370 BUSD (2021)



Virtualization

Containers - **kubernetes**



Cloud storage for the consumer market

These concepts are quite often mixed up

Cloud storage for personal use

- ✓ Google Drive
- ✓ OneDrive (Microsoft)
- ✓ pCloud (Swiss company)
- ✓ Mega (New Zealand company)
- ✓ Sync.com (Canadian company)
- ✓ Dropbox
- ✓ iCloud (Apple)
- ✓ Box
- ✓ Tresorit (Swiss company)
- ✓ Mediafire
- ✓ Internxt

- Block Level File Sync?
- End-to-end encryption
- Zero-knowledge?
- TLS, SSL, AES

Personal cloud storage

With personal cloud storage, you're the one who owns and controls the physical device where your data is being stored. These devices are a type called network attached storage or **NAS**.

A NAS can be used not only from your local network but also remotely.

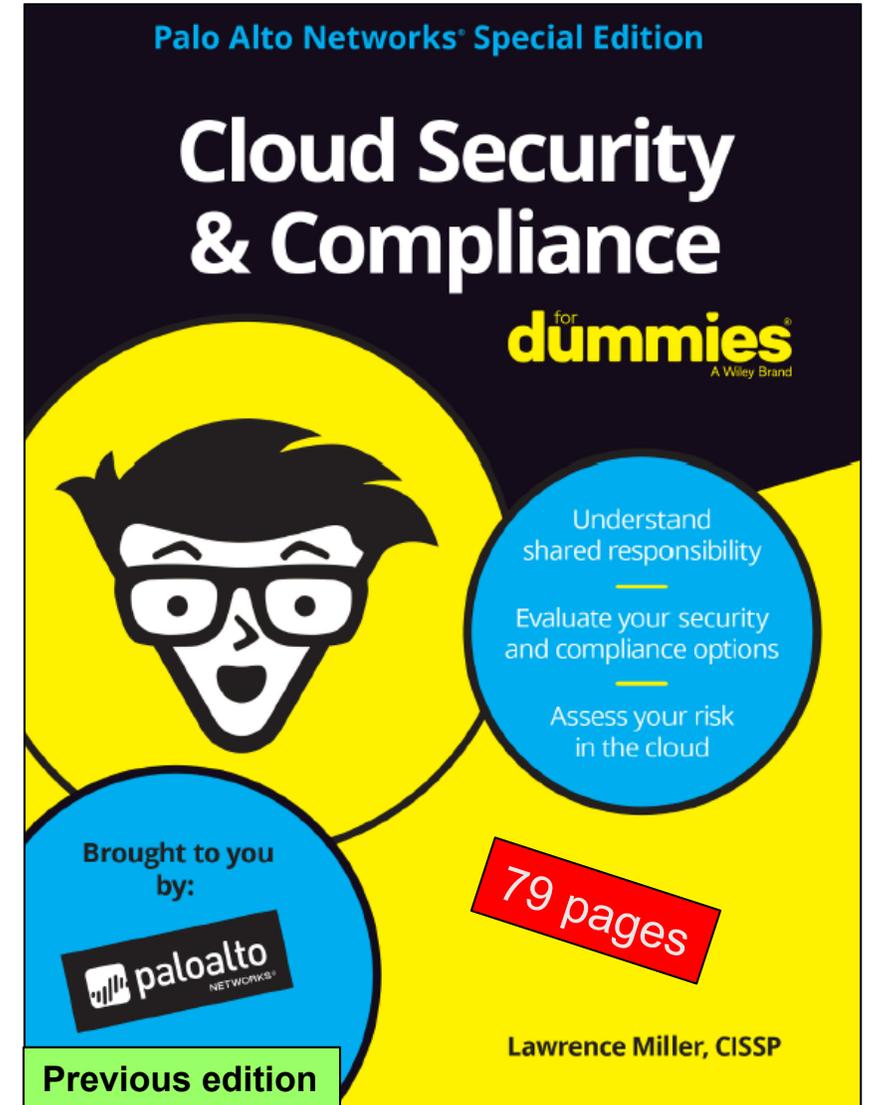
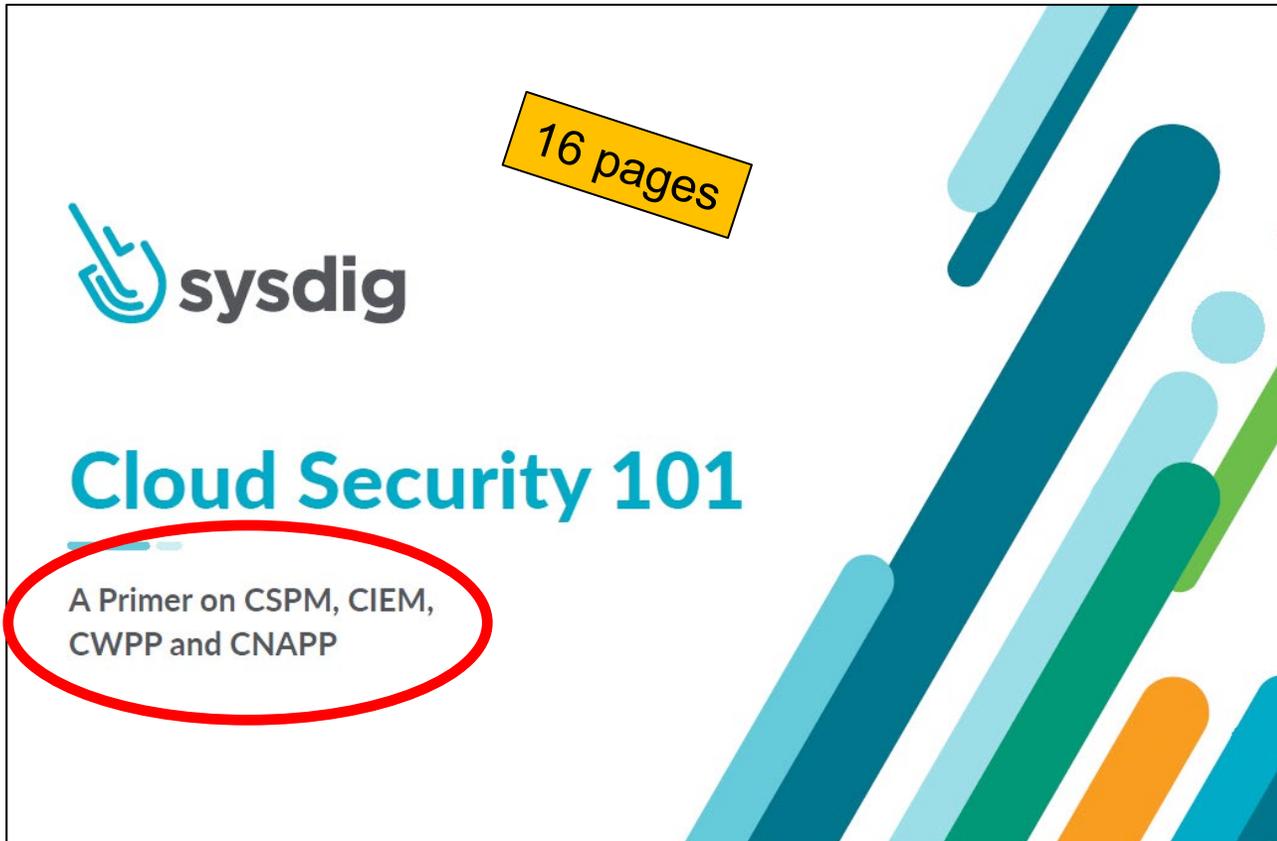
The ability to access your storage remotely allows you to do things like backup your phone's photos from anywhere and access your files on your home network while away.

In this way you can keep your data more private than if it were being uploaded onto a cloud storage service.



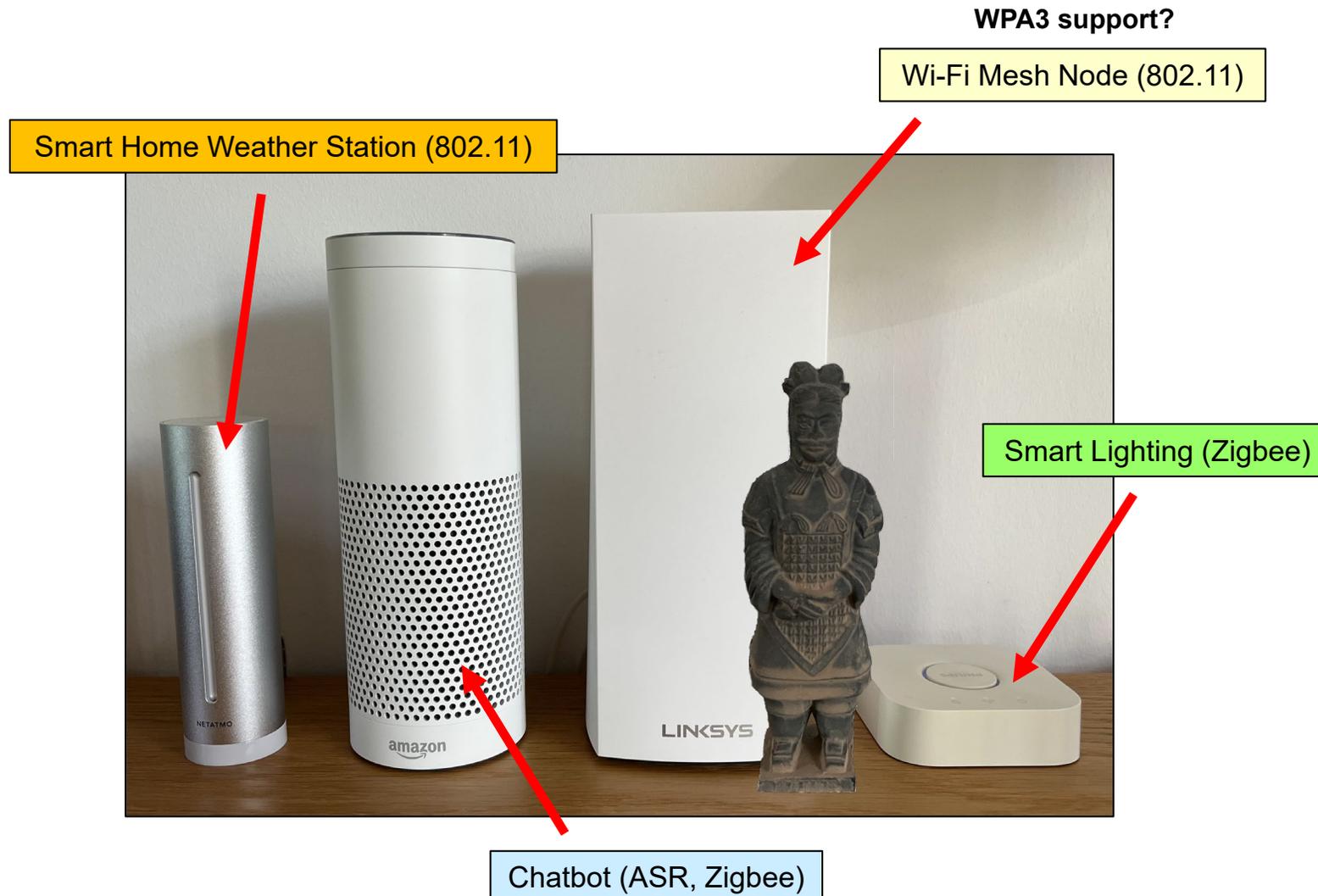
Cloud security

Clouds are not bulletproof



IOT - Devices @ Home

Cloud connected



Devices @ HOME

Not using cloud



ONVIF?



- ✓ Miracast
Direct Wi-Fi (aka. wireless HDMI)
- ✓ DLNA (Digital Living Network Alliance)
Makes it possible to share data over a home network
- ✓ TV Anywhere or Everywhere
Example: Feature on a Panasonic TV / recorder that lets you watch live or recorded TV programs on a smart phone away from home

Google Cast



Chromecast with Google TV

AirPlay



Apple TV



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