

Génie logiciel pour la conception d'un Système d'Information

CSC4521

**Voie d'Approfondissement
Intégration et Déploiement de Systèmes d'Information
(VAP DSI)**

Tools and Technologies

<http://jpaulgibson.synology.me/Teaching/TSP/CSC4521/CSC4521-ToolsAndTechnologies.pdf>

Tools and technologies

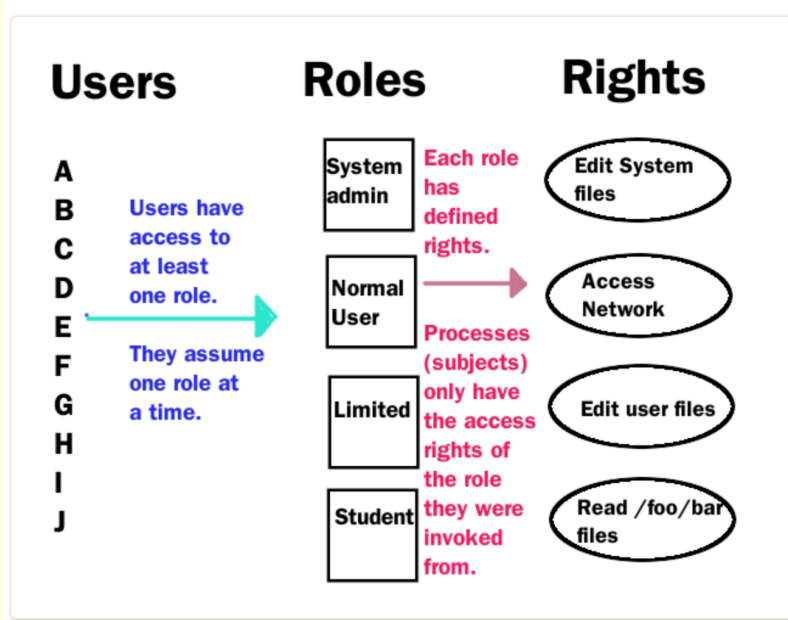
- Access and Data Security Modelling
- Moving from Functional to Physical Architecture
- Router Technologies and APIs
- Sensor Technologies and specifications
- Single Board PCs (for embedded devices)
- Connecting IOT with the cloud (and cloud gateways)
- Choosing Cloud Service Contracts

Access and Data Security Modelling

The Old Model - Access Control Matrix:

		Objects							
		1	2	3	4	5	6	7	etc
Users	A	RW	WX	X	W	r	W	RWX	
	B	W	X	-	W	r	RW	r X	etc →
	C	-	X	RW	RWX	RWX	r X	RW	
	D								
	E								

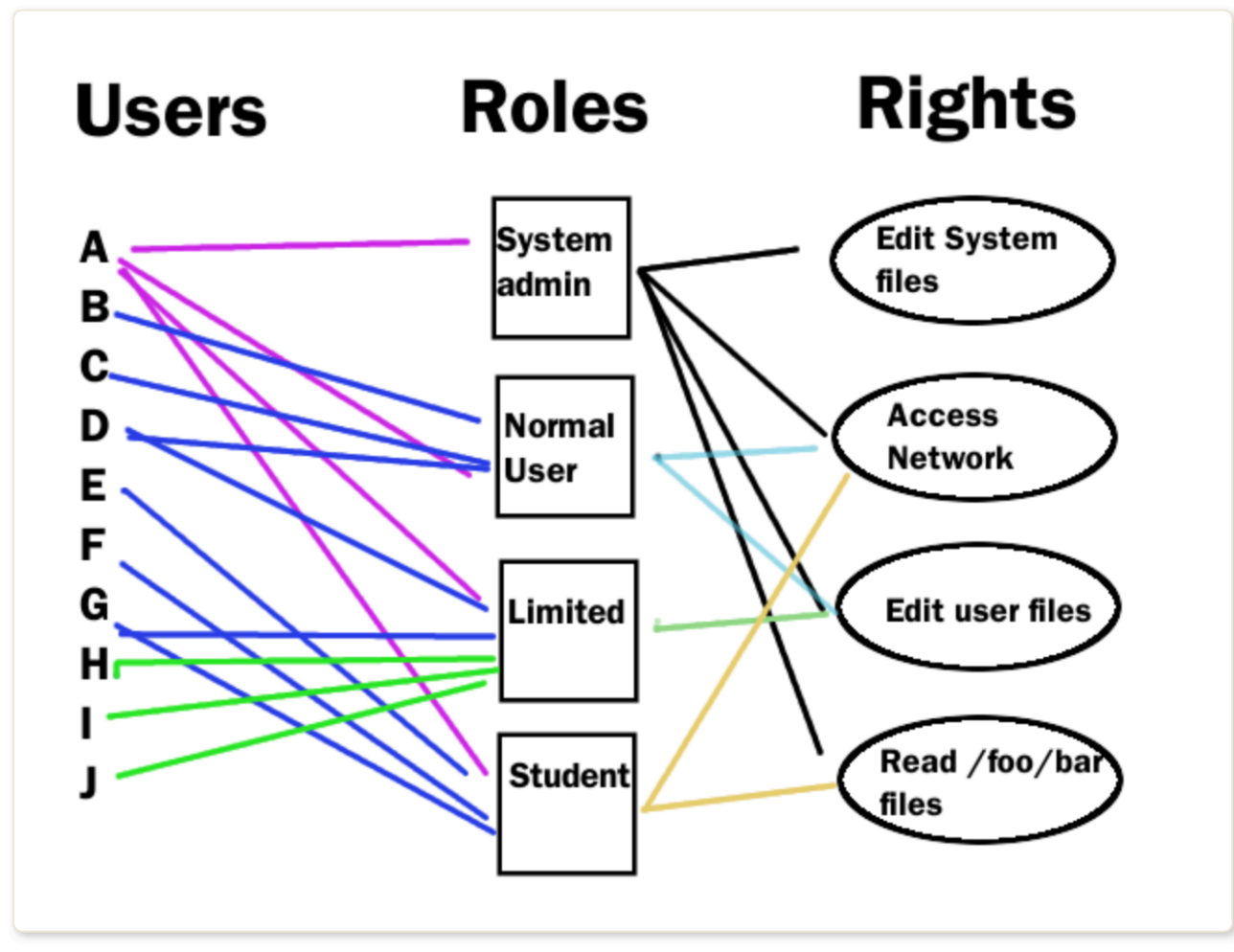
The New Model - Role Based Access Control:



<https://sites.google.com/site/cacsolin/role-based-access-control>

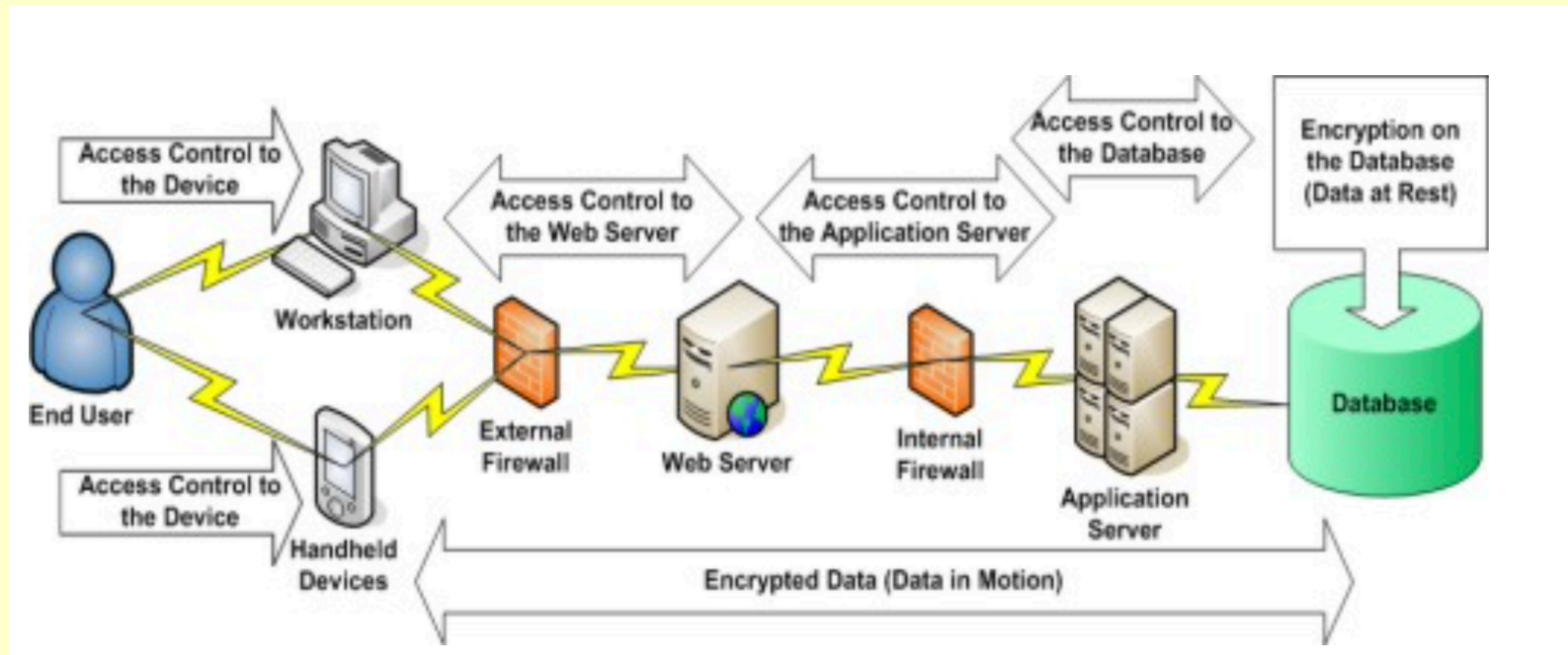
Access and Data Security Modelling

Using RBAC to manage access:



<https://sites.google.com/site/cacsolin/role-based-access-control>

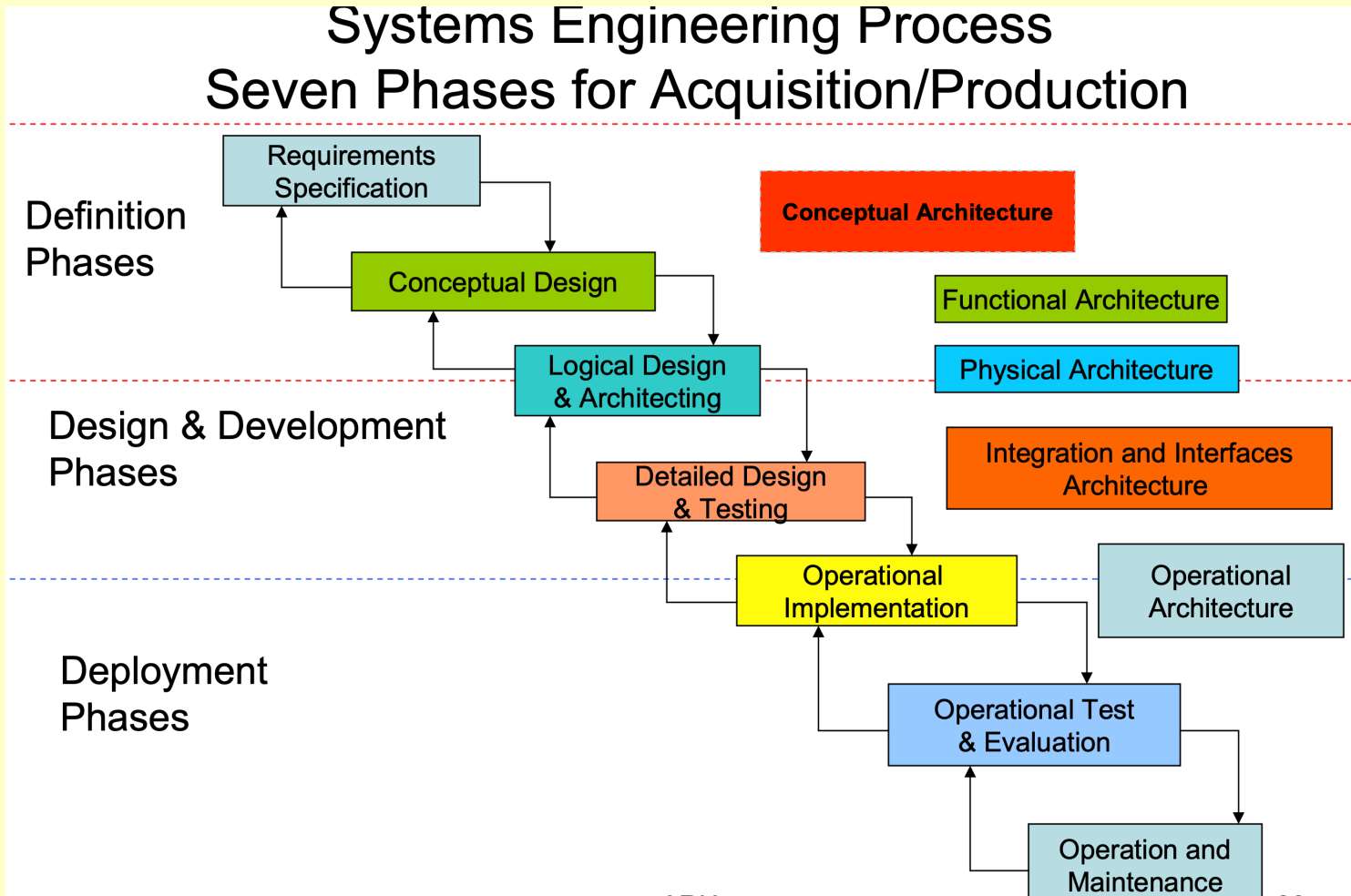
Access and Data Security Modelling



Before implementing encryption, an organization needs to ensure access to the database is limited to authorized users. Access controls that should be addressed include rules for creating users, users' privileges to access objects, and users' permissions to perform commands and various tasks

<https://www.cdc.gov/cancer/npcr/tools/security/encryption2.htm>

Moving from Functional to Physical Architecture

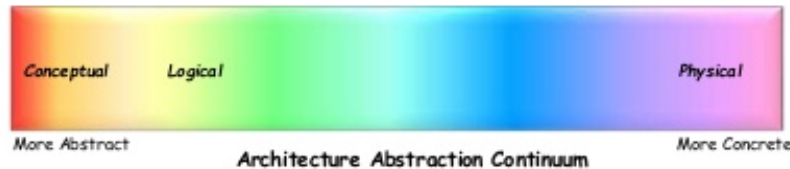


<https://ndiastorage.blob.core.usgovcloudapi.net/ndia/2005/systems/wednesday/habayeb.pdf>

Moving from Functional to Physical Architecture

Conceptual vs. Logical vs. Physical Architecture

- Conceptual, Logical, and Physical representations are the most common layers of architectural abstraction



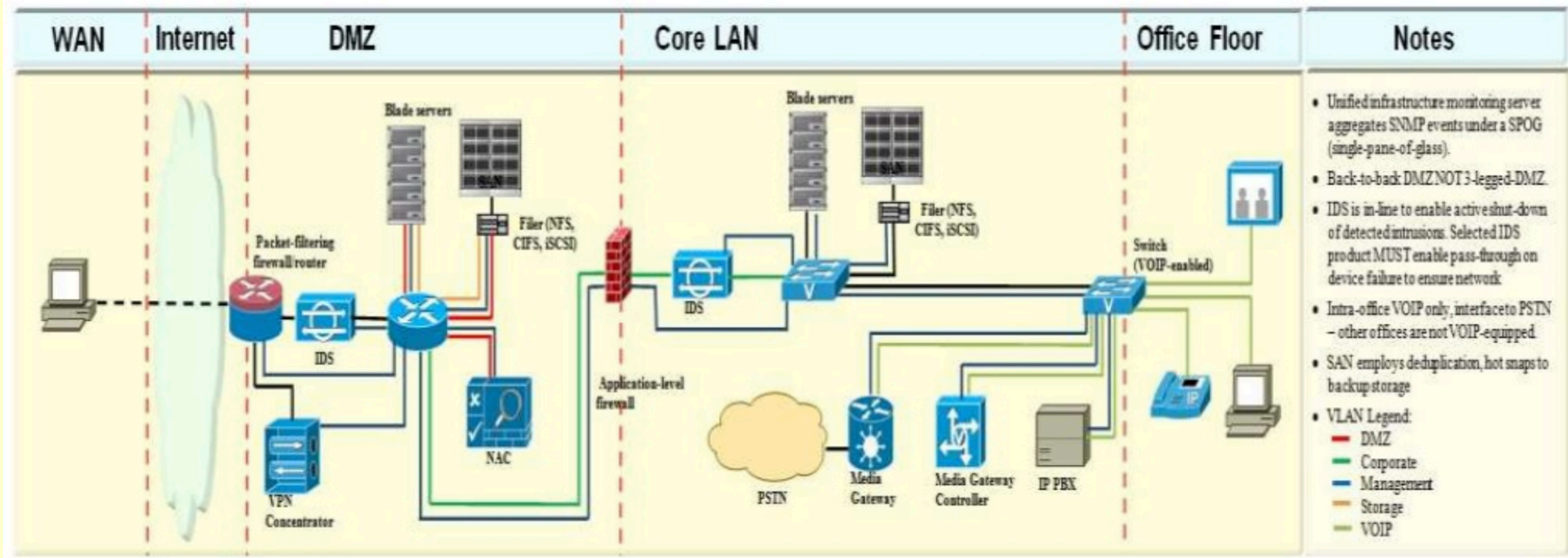
- Conceptual Architecture is the highest level of abstraction, and often does not get very detailed
- Logical Architecture applies to a wide range of abstraction levels between Conceptual and Physical and can be very detailed
- Physical Architecture is the least abstract representation and typically is very detailed

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<https://www.slideshare.net/wweinmeyer79/an-introduction-to-fundamental-architecture-concepts-25828722>

Moving from Functional to Physical Architecture

- Example: a detailed logical model that almost maps 1:1 with the corresponding physical model that realizes the Logical architecture

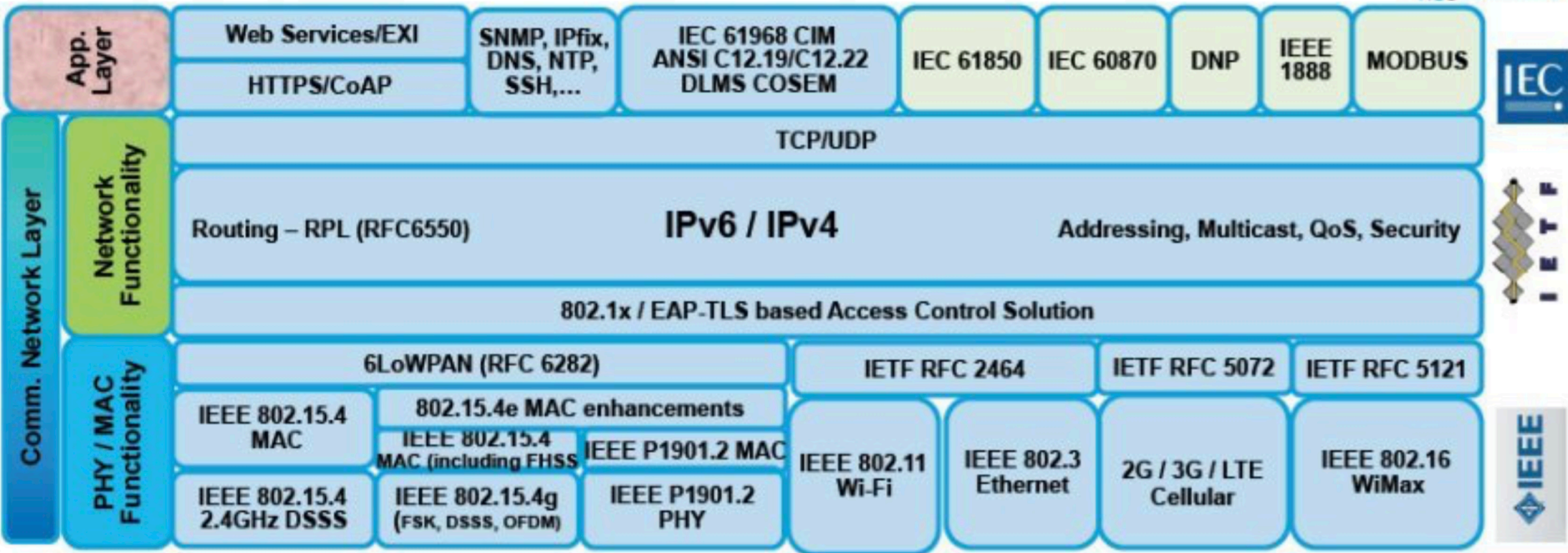


<https://www.slideshare.net/wweinmeyer79/an-introduction-to-fundamental-architecture-concepts-25828722>

Router/Gateway Technologies and APIs

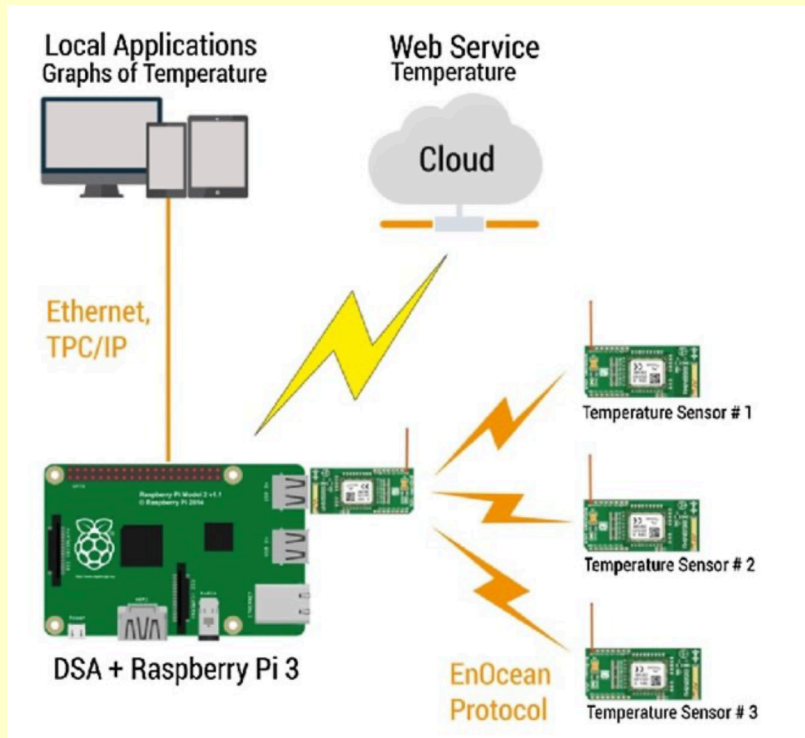
<https://www.postscapes.com/internet-of-things-protocols/>

Open Standards Reference Model



Router/Gateway Technologies and APIs

Sometimes all you need are routers and/or gateways

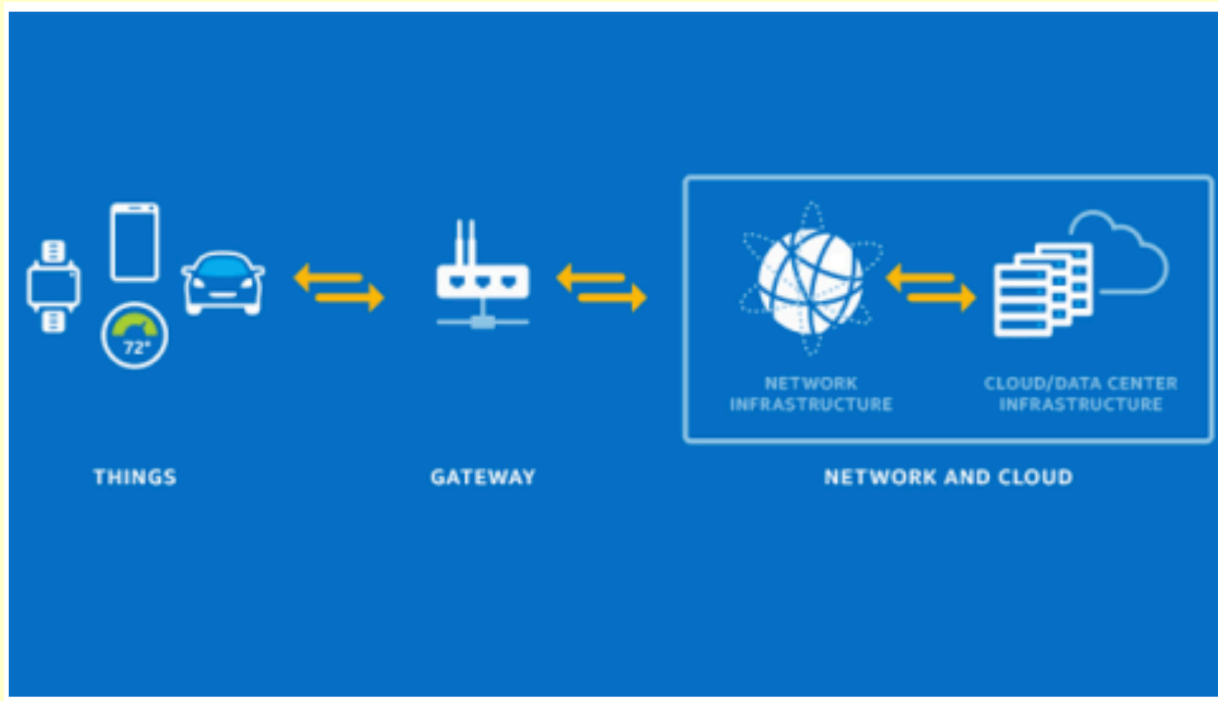


“An indoor predicting climate conditions approach using Internet-of-Things and artificial hydrocarbon networks”

https://www.researchgate.net/publication/329022937_An_indoor_predicting_climate_conditions_approach_using_Internet-of-Things_and_artificial_hydrocarbon_networks/figures?lo=1

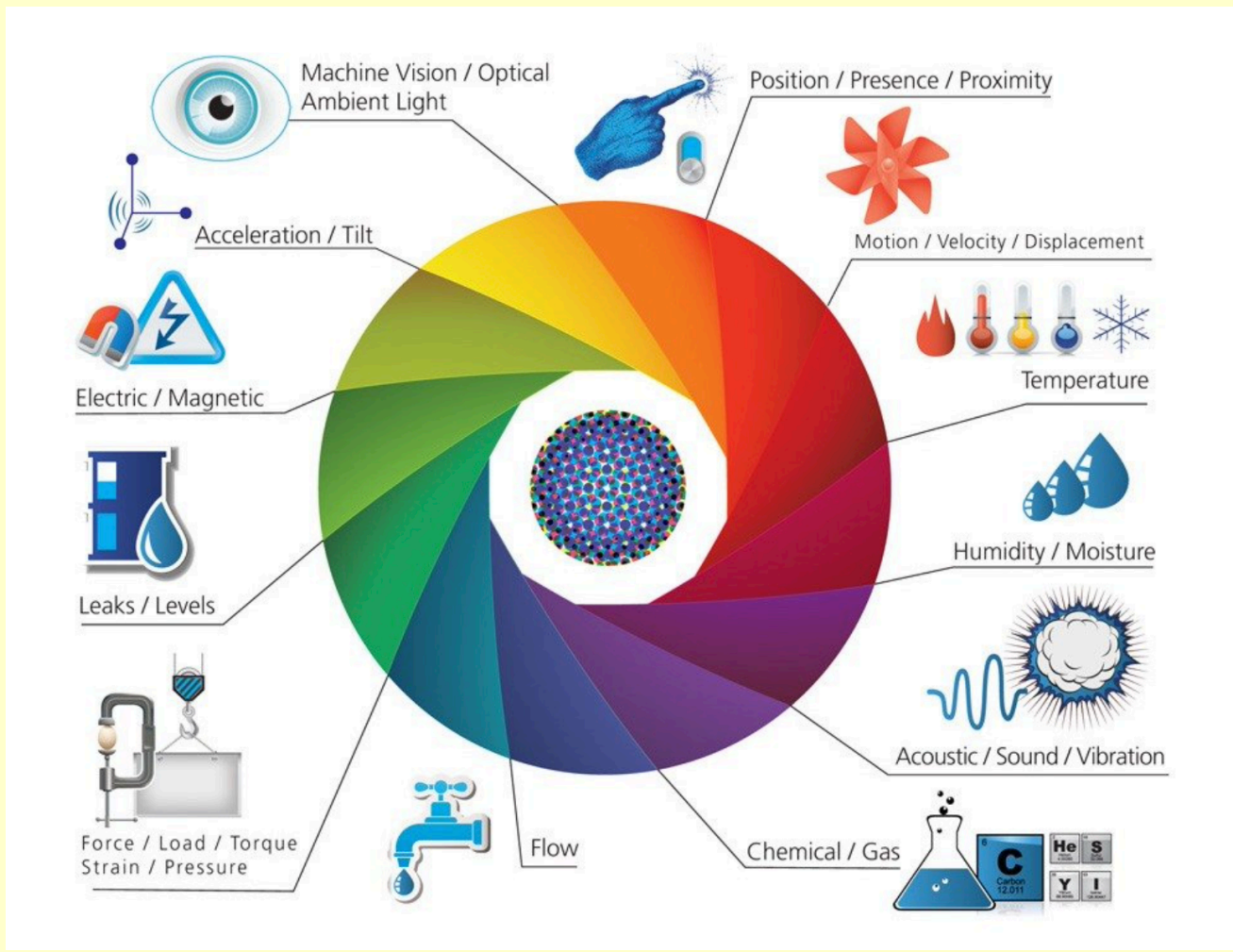
Router/Gateway Technologies and APIs

IoT cellular gateway routers - What are they and do you need one?



<https://www.mushroomnetworks.com/blog/iot-cellular-gateway-routers-what-are-they-and-do-you-need-one/>

Sensor Technologies and specifications



<https://www.postscapes.com/iot-sensors-actuators/>

Sensor Technologies and specifications



2.4GHz ONE-T

WIRELESS IOT TEMPERATURE SENSOR

The BeanDevice® 2.4GHz ONE-T is a wireless temperature data logger providing a storage capacity of 1 million

Example Technical Specification

Over-the-air configuration (OTAC) parameters

Alarm Threshold	3 thresholds of Alarms Alert <Action> Alarm
Data Acquisition mode	Low Duty Cycle Data Acquisition (LDCDA) Mode: 1s to 24 hour Alarm mode: 1s to 24 hour
Power Mode	Battery saver mode

Embedded Data logger

Storage Capacity	up to 1 000 000 data points
Wireless data downloading	3 minutes to download the full memory (average time)

RF Specifications

Wireless Technology	Ultra-Power and license-free 2.4Ghz radio technology [IEEE 802.15.4E]
WSN Topology	Point-to-Point / Star
Data rate	250 Kbits/s
RF Characteristics	ISM 2.4GHz – 16 Channels.
TX Power	+18 dBm
Receiver Sensitivity	-95,5 dBm to -104 dBm
Maximum Radio Range	300 m (Line of Sight) , 30-80m (Non Line of Sight)
Antenna	Omnidirectional antenna 2.2dBi

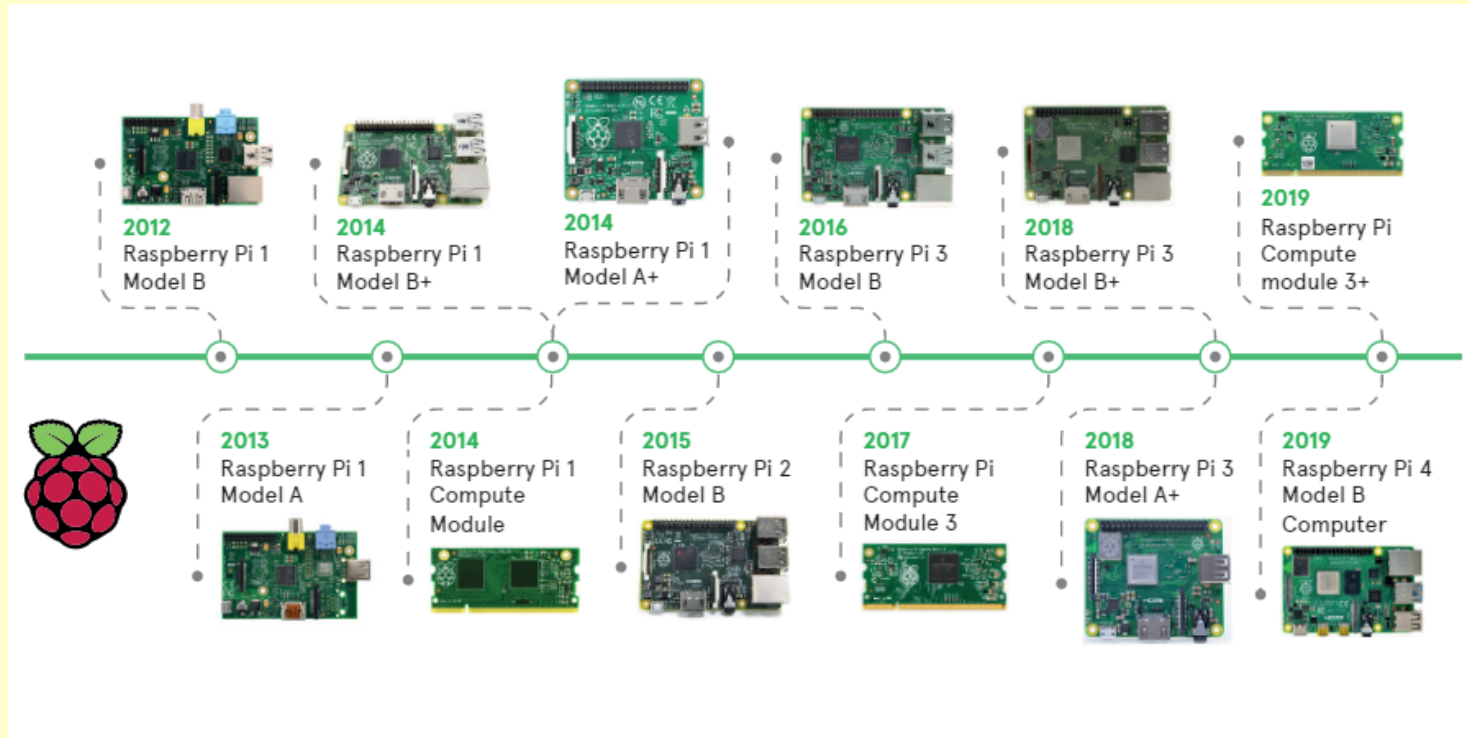
Temperature sensor specifications

Temperature Sensor technology	Silicon temperature probe –Probe watertightness · IP67	
	Mechanical assembly type · steel tube	
Measurement range	High accuracy temperature probe. BND-2.4GHz-ONE-T-HA-CL BND-2.4GHz-ONE-T-HAEY-CL	-10 °C to +60 °C
	Standard accuracy temperature probe with cable length. BND-2.4GHz-ONE-T-ST-CL BND-2.4GHz-ONE-T-STCORE-CL	-50 °C to +150 °C
	Standard accuracy temperature probe without cable length. BND-2.4GHz-ONE-T-ST	-25°C to +75°C
Measurement accuracy	High accuracy temperature probe. BND-2.4GHz-ONE-T-HA-CL BND-2.4GHz-ONE-T-HAEY-CL	±0.2°C between -10°C and -5 °C ±0.1°C between -5°C and +45°C ±0.2°C between +45°C and +60°C
	Standard accuracy temperature probe BND-2.4GHz-ONE-T-ST-CL BND-2.4GHz-ONE-T-STCORE-CL	±0.3 °C between -10 °C and +60 °C ±(0.3 + 0.012[T-60]) °C between +60 °C and +150 °C ± (0.3 - 0.012[T+10]) °C between -50 °C and -10 °C
Sensor resolution	High accuracy temperature probe. BND-2.4GHz-ONE-T-HA-CL BND-2.4GHz-ONE-T-HAEY-CL	0.0034 °C
	Standard accuracy temperature probe BND-2.4GHz-ONE-T-ST-CL BND-2.4GHz-ONE-T-STCORE-CL	0.1 °C

<https://www.beanair.com/wireless-iot-temperature-sensors-specifications.html>

Single Board PCs (for embedded devices)

Raspberry Pi Boards are a common solution

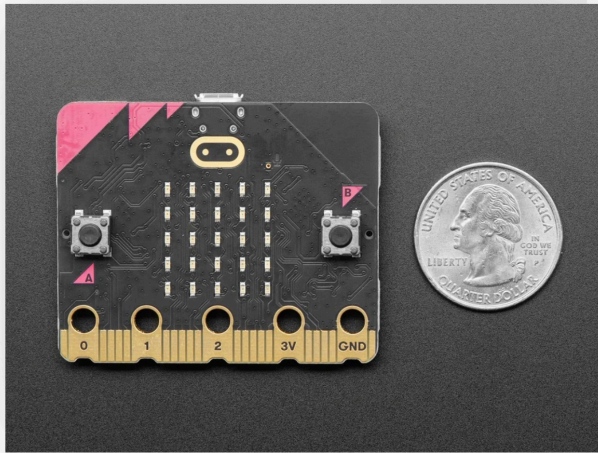


<https://files1.element14.com/community/themes/images/ogp/HistoryPi.png>

Single Board PCs (for embedded devices)

Raspberry Pi Boards are not the only solution

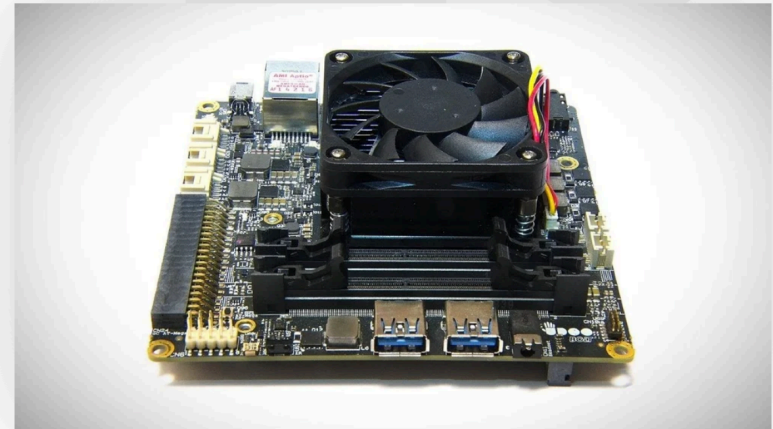
BBC Micro:Bit V2



BBC Micro:Bit V2 (Source: Adafruit)

SBC	BBC Micro:Bit V2	Memory	512 KB Flash ROM, 128 KB RAM
Processor	ARM Cortex-M4	Market Price (approx., USD)	\$15
GPU	n/a		

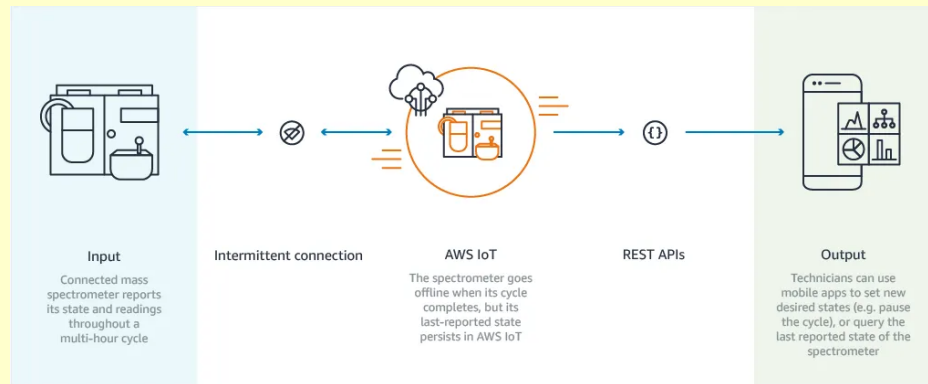
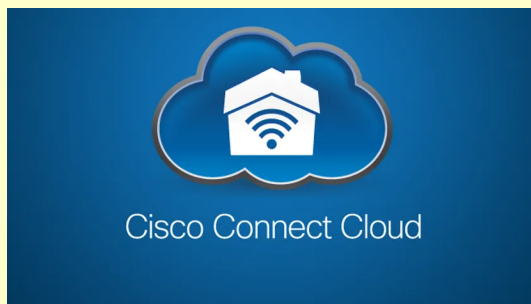
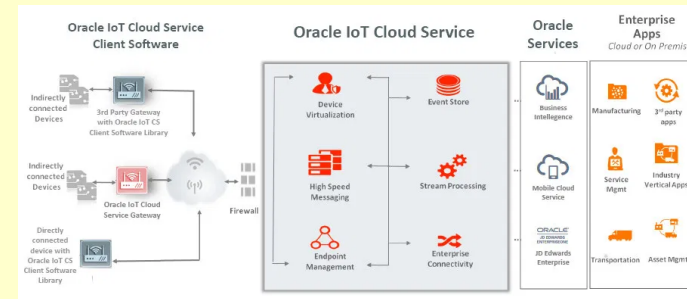
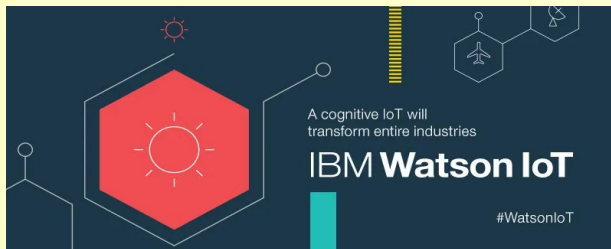
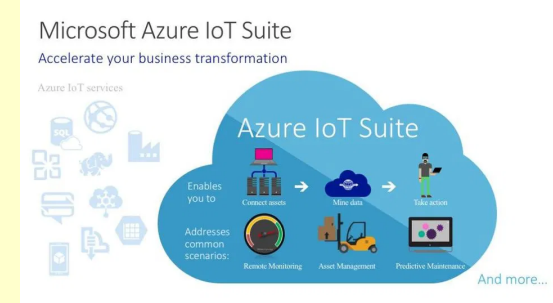
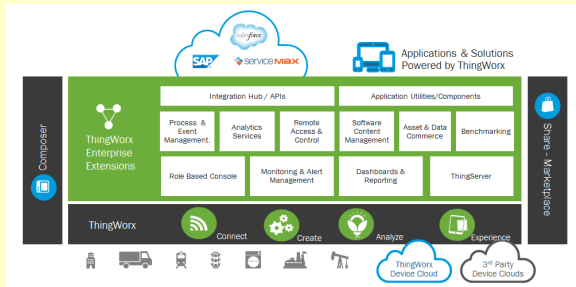
Udoo Bolt V8



SBC	Udoo Bolt V8	Memory	2x DDR4 Dual- channel 64-bit Up To 32 gb
Processor	AMD Ryzen Embedded V1605B Quad Core @ 2.0 Ghz	Market Price (approx., USD)	\$418
GPU	Amd Radeon Vega 8		

<https://all3dp.com/1/single-board-computer-raspberry-pi-alternative/>

Connecting IOT with the cloud (and cloud gateways)



<https://dzone.com/articles/10-cloud-platforms-for-internet-of-things-iot>

Choosing Cloud Service Contracts



Choose Your Cloud Partner Wisely

<https://www.magicfinserv.com/choose-your-cloud-partner-wisely/>

8 criteria to ensure you select the right cloud service provider

<https://www.cloudindustryforum.org/content/8-criteria-ensure-you-select-right-cloud-service-provider>

Practical Guide to Cloud Service Agreements

<https://www.omg.org/cloud/deliverables/CSCC-Practical-Guide-to-Cloud-Service-Agreements.pdf>