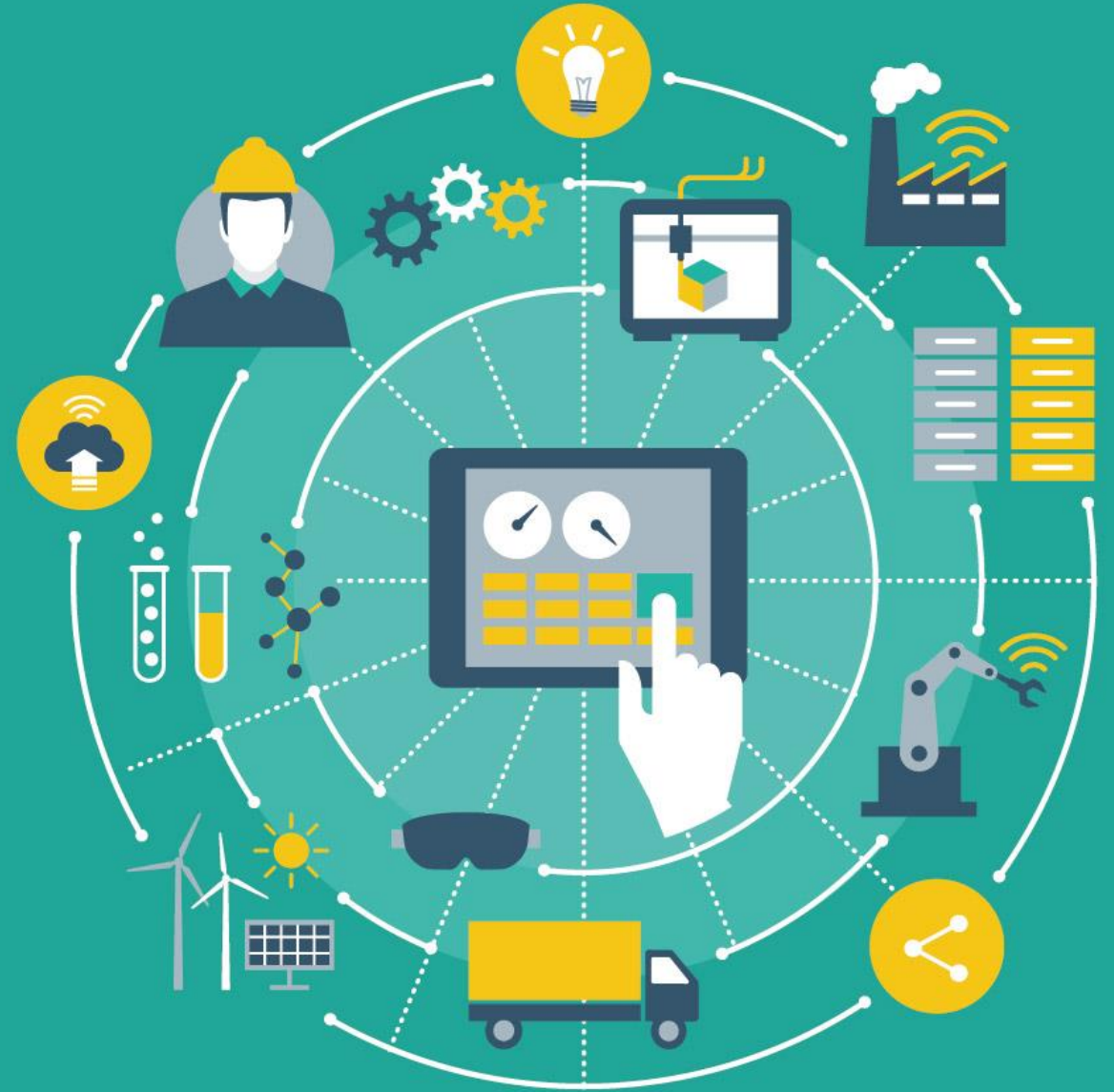IoT Software at a Glance

Operating System Selection Guide for IoT Devices

Presented by Advantech Embedded IoT Group

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The ability of embedded systems to **connect and communicate over a network** is the essence of IoT. Indeed, IoT operating systems are **a type of embedded OS** and are, by definition, designed to **enable data transfer over the internet.**

IoT OS are designed to **perform within particular IoT device constraints**, including restrictions on **memory, size, power, and processing capacity**.

Things to Consider When Choosing an IoT OS

What level of reliability and long-term support is needed?

The key to this question is the type of edge device being created. Each has its own lifecycle.

Does this OS provide scalability?

Building an IoT edge device with a scalable OS means accommodating different systems won't necessitate extensive future changes.

Will this OS ensure device security?

The level of security features needed varies according to the sensitivity of the data handled and/or the industry or application in which the intelligent edge device is used.

Does this OS offer easy device management?

Device management is key to keeping a device running smoothly. Some OS provide specialized features for a specific set of applications and peripherals.

What are your performance requirements?

Aligning the needs of your IoT solution with actual OS capabilities is another consideration; especially as it relates to computer or processing power, and real-time performance.

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Windows for IoT

Windows for IoT (Windows Embedded) is a series of customizable operating systems for special equipment. This series reduces time to market while providing top-notch technologies, tools, and resources that integrate and quicken next generation device development.

Benefits of Windows for IoT

- Lower development costs
- Runtime licensing
- Common source codes
- Intellectual property protection
- Long-term commitment and support for Windows Embedded platform, and up to 10 ~ 15 years of availability
- Complete ecosystem reduces time to market

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Windows for IoT Product Series

Windows 10 IoT Core and Services

For small-footprint, smart devices | Prototype and commercialize low cost devices

Windows 10 IoT Enterprise

For fixed-function, smart devices | Locked down, full edition of Windows 10

Windows Server IoT 2019

For the most demanding edge computing workloads

SQL Server IoT 2019

For embedded solutions requiring full power SQL Servers

10 years of support, security & manageability

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Windows IoT 10 Enterprise delivers the full power of Windows to intelligent edge devices

It delivers the **same manageability, security, and application/peripheral support** as **Windows 10 Pro;** and can leverage **container, AI, Machine Learning** and **cloud technologies**.

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Multiple Windows 10 Editions

Windows 10 IoT Enterprise is designed for dedicated devices with advanced lockdown features. It provides **10 years of support and special pricing.**

Windows 10 Pro and Enterprise are intended for **general purpose business PCs and laptops.**

· Pro releases are supported for 18 months

· Enterprise is the same as IoT Enterprise, but is licensed exclusively to end-users and can't be re-sold

Windows 10 Home is designed for personal use and has features that allow consumers to be more creative and productive.

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Windows 10 IoT Enterprise

A full edition of the Windows 10 operating system for developing fixed-function, smart devices.

Minimum Requirements

1 GHz
or faster X86 or X64 CPU

1 GB
RAM (2 GB for 64-bit)

16 GB
Storage (20 GB for 64-bit)

- Windows 10 Enterprise feature set with IoT licensing terms

- Familiar interface with lockdown features to control user experience

- Same deployment, manageability, and servicing as desktops

- A rich user experience with Win32 and Universal Windows Platform (UWP) apps

For details see https://docs.microsoft.com/windows-hardware/design/minimum/minimum-hardware-requirements-overview

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Acquisition Channels for Windows 10

The OEM Embedded channel was created for developing dedicated devices; and is optimized for features, price, and licensing rights.

The general-purpose OEM channel exclusively licenses Windows 10 Pro and Home.

The volume licensing channel provides businesses with unique enterprise offerings for their internal devices.

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OEM Embedded Channel Delivers Low Prices and 10-year Support

Advantech provides an **OEM Embedded license for Windows 10 IoT Enterprise** standalone, and can integrate the OS with Advantech boards or system products. In addition, Advantech offers **OS image customization** and a **lockdown utility** to decrease time-to-market.

Channel	Usage	Desktop operating systems	Licensed to	Price	Support lifecycle	Resellable
OEM embedded	**Dedicated device**	**Windows 10 IoT Enterprise Windows 10 IoT Core**	**Physical device**	**$**	**LTSC: 10 yr SAC: 30/18 months**	**Yes**
OEM MNA and SB	General purpose device	Windows 10 Pro Windows 10 Home	Physical device	$$	18 months	Yes
Volume licensing	General purpose device	Windows 10 Enterprise	End user company	$$$	LTSC: 10 yr SAC: 30/18 months	No

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Windows 10 IoT Enterprise Edition Selection

Version	Group	CPU (2020. Sep updated)	CPU (2019. May updated)
Window 10 IoT Enterprise	High End	Intel: Core i7, Core i9, Rest of Xeon AMD: Selected FX models (FX7500, FX9370, FX9590, FX7600P), Ryzen 7 All other non-specified CPUs	Intel: Core i7, Core i9, Rest of Xeon AMD: Selected FX models (FX7500, FX9370, FX9590, FX7600P), Ryzen 7 All other non-specified CPUs
	Value	Intel: Rest of Pentium Rest of Celeron Selected Atom: C2750, C2730, C2550, C2530, C2350, C3338, S1260, S1240, S1220 Core i3, Core i5, Core M Selected Xeon: E3-1225, E3-1501M, E3-1501L,E-2124G AMD: Rest of RX-Series, A10, A8, A12, Rest of FX Models, V13xx-V19xx, Ryzen 3, Ryzen 5 Qualcomm: SDM850	Intel: Rest of Pentium Rest of Celeron Selected Atom: C2750, C2730, C2550, C2530, C2350, C3338, S1260, S1240, S1220 Core i3, Core i5, Core M Selected Xeon: E3-1225, E3-1501M, E3-1501L,E-2124G AMD: Rest of RX-Series, A10, A8, Rest of FX Models, V13xx-V19xx, Ryzen 3, Ryzen 5 Qualcomm: SDM850
	Entry	Intel: Selected Pentium (N Series, J Series) Selected Celeron (N Series, J Series, G Series, 3000 Series, 4000 Series, 5000 Series) Rest of Atom VIA: All AMD: R1xxx, E1, E2, E-350, A4, A6, A9, G-Series, V10xx-V12xx, Athlon	Intel: Selected Pentium (N Series, J Series) Selected Celeron (N Series, J Series, G Series, 3000 Series, 4000 Series) Rest of Atom VIA: All AMD: R1xxx, E1, E2, E-350, A4, A6, A9, G-Series, V10xx-V12xx, Athlon

*Released 2020/9/15

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Windows Server IoT 2019 accommodates demanding edge-computing workloads

for **connecting, storing** and **analyzing** data from **large databases** of connected applications, networks, and web services.

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General Purpose Server vs. Server IoT

Licensing provisions	Windows server	Windows server IoT
Use case	General Purpose	Industry devices
Features and functionality	See next page for details	Same as the general purpose Server
Preinstallation on hardware	Optional	Required under standard licensing terms
Embedded application	N/A	Required (used only to run the embedded application)
Line of business applications	Optional	No
Enterprise database software	Yes	Only integrated as part of the embedded application

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Windows Server IoT 2019

This operating system bridges on-premises environments with Azure services, enabling hybrid scenarios that maximize existing investments.

- Increase security and reduce risk using multiple protection layers built into the operating system

- Evolve your datacenter infrastructure to achieve greater efficiency and scale with Hyper-converged Infrastructure (HCI).

- Enables developers and IT pros to create cloud native applications and modernize their traditional apps using containers and micro-services.

- Evolve your datacenter infrastructure and engender greater efficiency and security.

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Windows Server IoT 2019 Editions

Windows Server IoT 2019 Essentials Edition	Windows Server IoT 2019 Standard Edition	Windows Server IoT 2019 Datacenter Editions
A cloud-connected first server for up to 25 users and 50 devices.	Ideal for customers with low density or non-virtualized environments.	Ideal for highly virtualized and software defined datacenter environments.
25 users/**50** devices No server CALs required	**Unlimited**, based on CALs	**Unlimited**, based on CALs
2 VMs	**2** VMs	**Unlimited** VMs
Must be root of domain	**2** Hyper-V containers[2]	**Unlimited** Hyper-V containers
	Unlimited Windows Server containers	
		Storage features including: **Storage Replica & Storage Spaces Direct**
		New Networking Stack
		Shielded VMs & Host Guardian Service

[2]Windows Server IoT 2019 Standard Edition entitles up to 2 VMs or 2 Hyper-V containers

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Windows Server IoT 2019 Feature Comparison

Licensing Provisions	Windows Server IoT 2019 Standard	Windows Server IoT 2019 Essentials	Windows Server IoT 2019 Datacenter
Number of virtual instances	2	2	Unlimited
Preinstalled OS	Mandatory	Mandatory	Mandatory
Embedded application	Mandatory	Mandatory	Mandatory
Line of business applications	No	No	No
Client Access License (CAL) required	Yes	No	Yes
Core based licensing	Yes	Yes	Yes

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"Client Access License" (CAL) Explained

The "Client Access License" (CAL) grants customers the right to use **hardware devices** (e.g. specialized devices, PDAs, and cell phones) to **legitimately connect to the server host**.

In simple terms, if a customer only obtains a legitimate server software license, but doesn't purchase any "Client Access License" (CAL), their specialized devices and employees will not have the right to connect to a server.

CAL

End user device

Server

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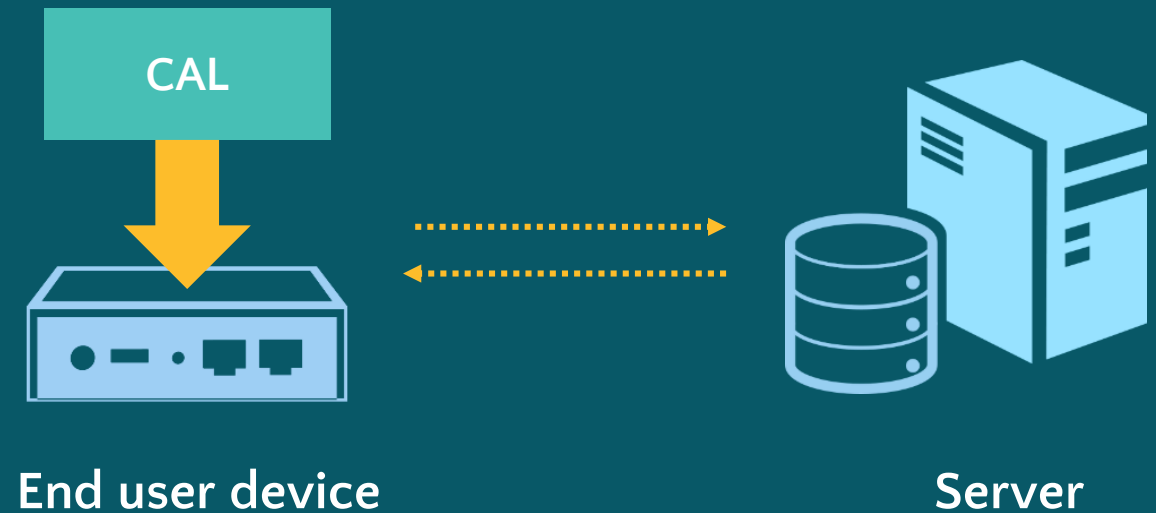
Windows Server IoT 2019 CAL

When a customer buys Windows Server IoT 2019, they receive a server license that allows installation on the OS of one computer. A server license by itself does not provide the legal right to allow others to connect to that computer, whether they work for the company or not. Instead, **each employee or employee's device requires a Client Access License (CAL) to connect to Windows Server IoT 2019 Standard or Datacenter editions.**

Both a Windows Server CAL (User or Device) and an RDS CAL are required for remote desktop access. RDS CALs contain a product key for activation.
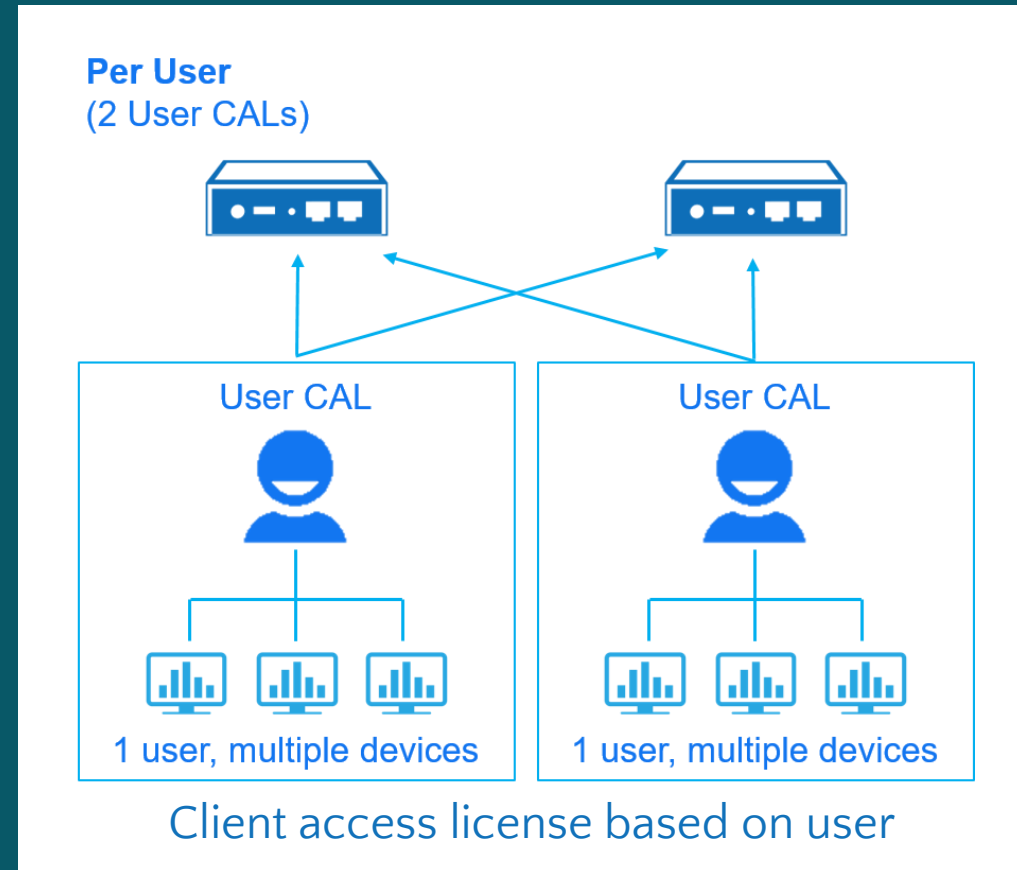
User CALs	Device CALs	RDS CALs
Single user with unlimited devices	Single device with unlimited users	Required for remote desktop access
Ideal for companies with employees who need to have roaming access to the corporate network using multiple devices, as well as from unknown devices.	Ideal for companies with multiple users for one device, such as shift workers.	Ideal for companies with users that need to access programs or the full desktop remotely.

The Difference Between User CAL and Device CAL

User CALs

The User CAL, enables you to purchase **a CAL for every user who accesses the server** to use services such as file storage or printing, regardless of the number of devices they use for that access.

Purchasing a User CAL might make more sense **if your company's employees need to have roaming access to the corporate network using multiple devices, or from unknown devices, or if you simply have more devices than users** in your organization.
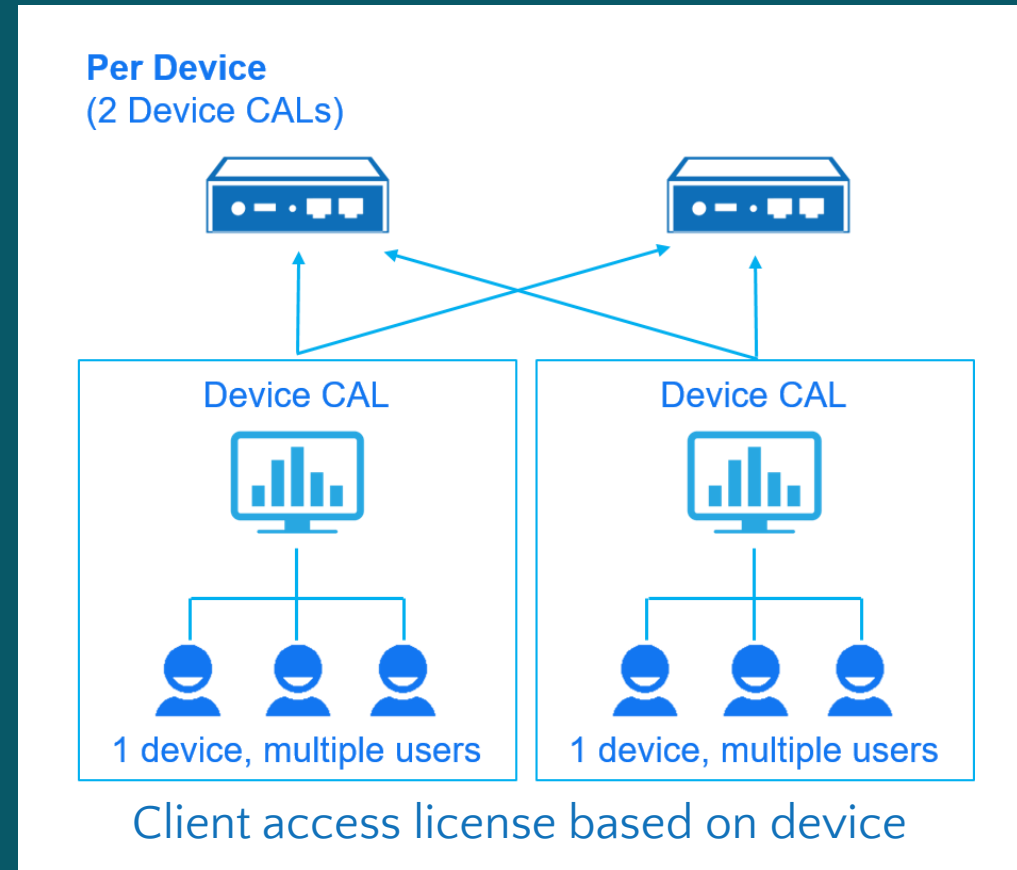
*Only cover servers with OS version equal or older than version of CAL

Per User
(2 User CALs)

User CAL

User CAL

1 user, multiple devices

1 user, multiple devices

Client access license based on user

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The Difference Between User CAL and Device CAL

Device CALs

With a Device CAL, you purchase **a CAL for every device that accesses your server — regardless of the number of users** who use that device to access the server.

Device CALs may make more economic and administrative sense **if your company has workers who share devices — for example, on different work shifts.**

Per Device
(2 Device CALs)

Device CAL

Device CAL

1 device, multiple users

1 device, multiple users

Client access license based on device

*Only cover servers with OS version equal or older than version of CAL

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Microsoft Software License Expert Experienced in IoT and Integration Services

As a 15-year authorized global Microsoft distributor, Advantech offers complete Windows IoT OS licensing as well as OS customization and Advantech hardware integration services.

Licensing Products:

Windows 10 IoT Enterprise
- Entry
- Value
- High End

Windows Server IoT 2019
- Essentials
- Standard
- Datacenter

Our Services:
- Global engineering support
- OS customization services
- Licensing consultation
- OS integration into Advantech hardware

Take the Next Step
Find out how Advantech accelerates your IoT deployment.

- Visit us online at:
  Advantech software distribution mini-site

- Contact our global branch offices:
  https://www.advantech.com/contact

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