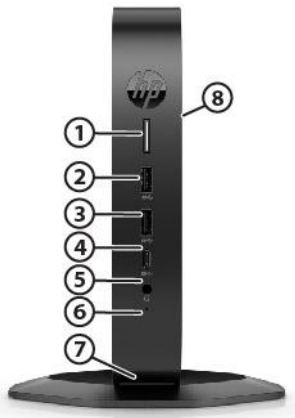
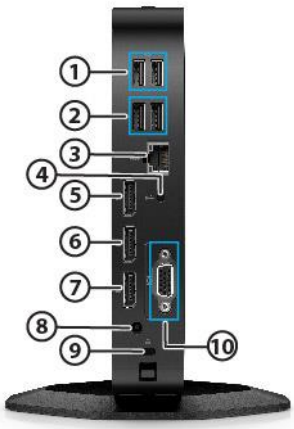
Overview

HP Elite t655 Thin Client





FRONT

1	Power button (with integrated power indicator)
2	USB-A 3.1 Gen 1 port
3	USB-A 3.1 Gen 1 port
4	USB-C® 3.2 Gen 2 port
5	3.5mm combo headset/audio jack
6	Flash memory activity indicator
7	Stand
8	100 x 100mm VESA mounting holes

BACK

1	(2) USB-A 2.0 port
2	(2) USB-A 3.2 Gen 1 port
3	RJ-45 (network)jack- option with or without DASH Manageability support
4	Audio-out (headphone)
5	DisplayPort™ 1.2 connector
6	DisplayPort™ 1.2 connector
7	DisplayPort™ 1.2 connector
8	Power connector
9	Security cable slot
10	Configurable Option Port supporting one of the following: • Blank; no optional configured port • DP/USB-C® with PD • DisplayPort™ over USB-C® with USB Power Delivery • (2) USB-A 3.2 Gen 1 port • HDMI digital video output • VGA analog video output • External Wi-Fi® antenna connector • Fiber Optic NIC connectors (SC or LC) • Serial port with configurable power • Dual serial ports (includes cable adapter)

Overview

AT A GLANCE

- AMD Ryzen R2314 System-on-Chip; 2.1 – 3.5 GHz; 4 cores, 4 threads[3]
- DASH Manageability support - Option to order with DASH or non-DASH
- AMD Memory Guard Secure Run technology that encrypts data in main memory
- DDR4 dual-channel SDRAM system memory; up to 2667 MT/s transfer rate; two SODIMM slots
- (3) DisplayPort™ 1.2 video outputs supporting up to UHD/4K (3840 x 2160 @ 60 Hz) resolutions

  NOTE: DisplayPort™ cables and displays sold separately.
- Solid-state flash memory storage; M.2 form factor modules; one slot
- Gigabit Ethernet (GbE) network connection; support for DASH out-of-band remote management
- Optional Allied Telesis M.2 Fiber Optic NICs; Fast Ethernet (100 Mb/s) or Gigabit (1,000 Mb/s)
- Optional Realtek WLAN 8852AE Wi-Fi 6 + Bluetooth® 5.2 WW adapter including antennas integrated internally in the chassis. (Antenna is internally integrated in the chassis with the Wi-fi® SKU)

  NOTE: Fiber optic and Wi-Fi® NIC options cannot be supported together[1]

  NOTE: Wireless features, performance and support may vary depending on environmental variables such placement, settings and firmware of your access points. Please contact your wireless vendor for support of your wireless environment
- Optional remote external Wi-Fi® antenna system
- Option Port with a selection of available factory options (see detailed listing later in this document)
- Integrated PC speaker for basic audio playback; 3.5 mm combo headset/audio port on front and 3.5 mm audio port on rear that can be configured as line in or line out supporting headphones, external speaker systems, or microphone
- 45W non-PFC external power adapter
- Security features include a TCG certified TPM version 2.0 and a system UEFI (BIOS) designed to address NIST SP 800-147 BIOS protection guidelines and NIST SP800-155 BIOS integrity measurement guidelines. A cable lock slot is provided for use with a cable lock to enable the system's physical security
- Passive thermal design (no cooling fans) and active thermal management technology that monitors the system operating temperatures, throttles SOC operation if appropriate and prevents unit thermal shutdown.
- Rated for a maximum ambient operating temperature of 40 degree C
- ENERGY STAR® certified configurations available and EPEAT® Silver registered in the United States. See http://www.epeat.net for registration status in other countries
- Post-consumer recycled plastics content greater than 50% total unit plastics (by weight)
- Low halogen[2] material content
- All models TAA compliant in North America

NOTE: See important legal disclosures for all listed specs in their respective features sections.

Overview

Warranty

HP one-year hardware limited warranty in most regions; HP Care Packs* are extended service contracts that go beyond your standard limited warranties; for more details visit http://www.hp.com/go/cpc

*HP Care Packs are sold separately. Service levels and response times for HP Care Packs may vary depending on your geographic location. Service starts on date of hardware purchase. Restrictions and limitations apply. For details, visit www.hp.com/go/cpc. HP Services are governed by the applicable HP terms and conditions of service provided or indicated to Customer at the time of purchase. Customer may have additional statutory rights according to applicable local laws, and such rights are not in any way affected by the HP terms and conditions of service or the HP Limited Warranty provided with your HP Product.

Technical Specifications

OPERATING SYSTEMS

- HP ThinPro, including HP /Smart Zero Core, HP Cloud Endpoint Manager[2]
- Windows 10 IoT Enterprise LTSC 2021[1]
- IGEL
- No OS

1. Not all features are available in all editions or versions of Windows. Systems may require upgraded and/or separately purchased hardware, drivers, software or BIOS update to take full advantage of Windows functionality. ISP fees may apply, and additional requirements may apply over time for updates. See http://www.windows.com.
2. Not all features are available with HP ThinPro, Smart Zero Core and FreeDOS.

PROCESSOR[3,4,5]

Model	CPU Frequency Max/Base	Cores/Threads	GPU Type	GPU Frequency
AMD Ryzen™ Embedded R2314 with Radeon™ Graphics	3.5/2.1 GHz	4/4	Radeon™ Graphics	1,200 MHz

3. Multicore is designed to improve performance of certain software products. Not all customers or software applications will necessarily benefit from use of this technology. Performance and clock frequency will vary depending on application workload and your hardware and software configurations. Intel's numbering, branding and/or naming is not a measurement of higher performance.
4. Processor speed denotes maximum performance mode; processors will run at lower speeds in battery optimization mode.
5. In accordance with Microsoft's support policy, HP does not support the Windows 8 or Windows 7 operating system on products configured with Intel and AMD 7th generation and forward processors or provide any Windows 8 or Windows 7 drivers on http://www.support.hp.com.

DISPLAY SUPPORT

Number of displays supported

A maximum of 3 displays are supported.
Combination:

3 x DisplayPort™ (onboard)

2 x DisplayPort™ (onboard) + 1 x DisplayPort over USB-C (optional)

2 x DisplayPort™ (onboard) + 1 x HDMI (optional)

2 x DisplayPort™ (onboard) + 1 x VGA (optional)

Technical Specifications

Video Resolution Support Matrix*

Windows 10 IoT 21H2* *Min of 8GB required	≤3 x FHD 1920 X 1080 @ 60Hz	1 x UHD/4K 3840 x 2160 @ 60Hz	2 x UHD/4K 3840 x 2160 @ 60Hz	3 x UHD/4K 3840 x 2160 @ 60Hz (2 x 4G RAM or above)
Static screen (no video)	✓	✓	✓	✓
1080 60fps(or below) video	✓	✓	✓	✓
4K 30fps video	✓	✓	✓	✓
4K 60fps video	✓	✓	✓	✓

ThinPro 8	≤3 x FHD 1920 X 1080 @ 60Hz	1 x UHD/4K 3840 x 2160 @ 60Hz	2 x UHD/4K 3840 x 2160 @ 60Hz	3 x UHD/4K 3840 x 2160 @ 60Hz (2 x 4G RAM or above)
Static screen (no video)	✓	✓	✓	✓

*For best 4K experience dual channel memory is required.

HP USB-C® DOCK G5 (support requires system to be configured with the Type-C® option Port)

Maximum resolution support for monitors connected to the HP USB-C® Dock G5:
Single Monitor – Max of 2560 x 1440 @60Hz refresh rate
Dual Monitor – Max of two monitors at 1920x1080 @60Hz refresh rate

For an expanded list of supported monitor combinations, refer to the HP Dock Quickspecs document. For the HP Elite t655 Thin Client, refer to the "DP 1.2 MF" column.

NOTE: The HP USB-C® Dock G5 is currently only supported with the Windows operating system

GRAPHICS

Number of displays supported:	3	
Video outputs:	Standard:	(3) DisplayPort™ 1.2
	Optional:	(1) DisplayPort™ over USB-C® with USB Power Delivery (1) VGA analog output (1) HDMI digital output
	NOTE: adding an optional output does not increase the number of displays supported.	
Max. screen resolution:	3840 x 2160 @ 60 Hz	

NOTE: HP recommends dual channel memory (two SODIMMs) configurations for optimal display resolution performance

MEMORY

Type:	DDR4 dual channel SDRAM
Data Transfer Rate:	Up to 2,667 MT/s
Peak Transfer Rate:	Up to 19,200 MB/s
Number of Slots	2 x SODIMM
Capacities:	4*, 8, 16 and 32 GB

NOTES:

- *** 4GB not configurable with Windows 10 IoT Enterprise LTSC 2021**
- The actual transfer rates will be dependent upon the specification of the SODIMM modules used
- The Graphics Processing Unit (GPU) uses part of the total system memory. System memory dedicated to graphics performance is not available for use by other programs
- HP recommends dual channel memory (two SODIMMs) configurations for optimal system performance

Technical Specifications

UEFI

UEFI Specification Revision	2.3.1
TPM 2.0	Meets requirements for Common Criteria, an independent third-party certification of trustworthiness Meets requirements for FIPS 140-2, a standard for cryptographic integrity
Security features	System UEFI designed to address NIST SP 800-147 BIOS protection guidelines and NIST SP800-155 BIOS integrity measurement guidelines

STORAGE*

Type:	NAND flash memory; non-volatile
Number of Sockets:	(1) M.2
Capacities:	32 GB M.2 eMMC flash module (32GB not configurable with Windows 10 IoT Enterprise LTSC 2021) 64 GB M.2 eMMC flash module 256 GB M.2 PCIe NVMe flash module 512 GB M.2 PCIe NVMe flash module

*For storage drives, GB = 1 billion bytes. TB = 1 trillion bytes. Actual formatted capacity is less. Up to 30 GB (for Windows 10 and 11) is reserved for system recovery software.

Input/Output

USB:	Front access:	(2) USB-A 3.2 Gen 1 port (1) USB-C® 3.2 Gen 1 port
	Rear access:	(2) USB-A 2.0 port (optional WOSK (designated for Power-on from Keyboard if equipped)) (2) USB-A 3.2 port (2) USB-A 3.2 Gen 1 ports (optional) (1) USB-C® DisplayPort™ (optional)
Video Outputs:	Standard:	(3) DisplayPort™ 1.2 digital outputs
	Optional:	(1) VGA analog output (1) HDMI digital output (1) DisplayPort™ over USB-C® with USB Power Delivery
	NOTE: adding an optional output does not increase the number of displays supported.	
I/O Interfaces:	Standard:	(1) RJ45 network connector (1) 3.5 mm combo headset/audio jack (front) (1) 4.5 mm DC audio jack (rear)
	Optional:	(1) Dual serial port with configurable power (2) serial ports enabled with an included cable adapter

Option Port: The rear I/O panel includes an Option Port that can be configured with one of the following factory options:

- Blank; no optional configured port
- 2 x USB-A 3.0 Gen 1 ports
- DisplayPort™ over USB-C® with USB Power Delivery
- HDMI digital video output
- VGA analog video output
- External Wi-Fi® antenna connector (requires Wi-Fi® adapter option)
- Fiber Optic NIC connectors; SC or LC connector (requires Fiber Optic NIC option)

- Serial port with configurable power
- Dual serial ports enabled with an included cable adapter

AUDIO/VIDEO

Audio Subsystem

- Internal amplified speaker system for basic audio playback
- 3.5 mm combo headset/headphone/analog microphone audio jack (front access)
- 3.5 mm /4.5mm combo line-out/ line-in socket (rear access)

Audio CODECs

- MP3
- AAC Stereo
- HE AAC
- Includes hardware acceleration support

Video CODECs

- MPEG-4 part 2 (DivX, Xvid)
- MPEG-4 part 10 (H.264, AVC), Advanced Video Coding (AVC) (H.264 encode & decode)
- MPEG-H part 2, High Efficiency Video Coding (HEVC, available with Windows 10 IoT Only) (H.265 (8-bit / 10-bit) decode and (8-bit) encode
- WMV 7/8/9 VC-1 & ASF Demuxer
- Includes hardware acceleration support

NETWORKING

Local Area Networking Realtek RTL8111EPH-CG Gigabit Ethernet (GbE) Controller with support for DASH out-of-band remote management and Realtek RTL8111HSH-CG Gigabit Ethernet (GbE) Controller with support non-DASH[2]

Wi-Fi® Networking Realtek 8852AE Wi-Fi 6 +BT5.2 WLAN[1]
Realtek 8852BE Wi-Fi 6 +BT5.2 WLAN[1]

1. Wireless access point and Internet service required and sold separately. Availability of public wireless access points limited. Wi-Fi 6 (802.11ax) is backwards compatible with prior 802.11 specs. Wi-Fi 6 is designed to support gigabit data rate when transferring files between two devices connected to the same router. Requires a wireless router, sold separately, that supports 80MHz and higher channels.
2. The term "10/100/1000" or "Gigabit" Ethernet indicates compatibility with IEEE standard 802.3ab for Gigabit Ethernet, and does not connote actual operating speed of 1 Gb/s. For high-speed transmission, connection to a Gigabit Ethernet server and network infrastructure is required.

FIBER OPTIC NETWORKING

Adapter Options:

- Allied Telesis AT-27M2/SC Fiber Fast Ethernet M.2 Adapter
- Allied Telesis AT-29M2/SC or LC Fiber Gigabit M.2 Adapter

Features:

- IEEE 802.1p priority encoding/tagging (QoS, CoS)
- IEEE 802.1q VLAN tagging
- IEEE 802.3x flow control
- Buffer/FIFO: 22K transmit and 40K receive
- Loopback mode
- Descriptor-Based Buffer Management
- Wake-on-LAN from S3 (Sleep) and S4 (Hibernate) not supported (AT-29M2)

Technical Specifications

- Link Detection and PHY interface power; the PHY interface, Link detection and Link LED should be enabled by default at power-up

Performance:

AT-27M2

- >= 85 Mbit/s receive, <= 30% CPU utilization
- >= 85 Mbit/s transmit, <= 30% CPU utilization
- >= 170 Mbit/s total bi-directional, <= 30% CPU utilization

NOTE: The minimum transfer size at 100 Mbit/s is 1 Gbps

AT-29M2

- >= 800 Mbit/s receive, <= 30% CPU utilization
- >= 800 Mbit/s transmit, <= 30% CPU utilization
- >= 1500 Mbit/s total bi-directional, <= 30% CPU utilization

NOTE: The minimum transfer size at 1000 Mbit/s is 1500 Gbps

External Interface: Complies with IEEE 802.3 100BASE-FX operation (AT-27M2)
Complies with IEEE 802.3 1000BASE-X operation (AT-29M2)

Power:

- Uses less than 1800 mW of power at full performance (AT-27M2)
- Uses less than 2100 mW of power at full performance (AT-29M2)
- Supports all PCI Express bus states L0, L0s, L1 and L2

Non-volatile Storage: The MAC address is unique for each system; assigned from the board assembly manufacturer's IEEE registered allocation.

The PCI subsystem ID is unique to HP and unique to each design to allow Windows Update to be finely controlled.

SOFTWARE SUPPORT

Host Environment	Protocol	HP ThinPro	Microsoft Windows 10 IoT Enterprise 2021
Remote Desktop Services	Remote FX (RFX), RDP	✓	✓
Citrix®	ICA, HDX	✓	✓
VMware® Horizon	RDP, PCoIP, Blast Extreme	✓	✓

Protocol Clients	HP ThinPro	Microsoft Windows 10 IoT Enterprise 2021
Citrix® Workspace app	✓	✓
Microsoft Remote Desktop Client		✓
Free Remote Desktop Client	✓	
VMware™ Horizon View™ Client	✓	✓
HP Remote Graphics Software (RGS)	via add-on	✓
Turbosoft TTerm for Linux® Terminal emulation Software	via add-on	
Turbosoft TTWin Terminal emulation software		via add-on
AVD/Win365	via add-on	via add-on

Browser Support	HP ThinPro	Microsoft Windows 10 IoT Enterprise 2021
Mozilla Firefox	✓	
Internet Explorer		✓
Microsoft Edge		✓

Security	HP ThinPro	Microsoft Windows 10 IoT Enterprise 2021
Smart Card	✓	✓
Log-on Manager	✓	✓
Read only Operating System	✓	✓
802.1x	✓	✓

Technical Specifications

Microsoft Firewall		✓
HP Write Manager		✓
Microsoft Unified Write Filter		✓

NOTE: the HP Write Manager is the default active write filter. The Microsoft Unified Write Filter is disabled by default but can be enabled by the user if required.

Management Tools	HP ThinPro	Microsoft Windows 10 IoT Enterprise 2021
HP Cloud Endpoint Manager	✓	✓
HP Device Manager	✓	✓
HP ThinUpdate		✓
HP Easy Tools	✓	
HP Smart Zero Client Services	✓	
Microsoft SCCM/EDM agent		✓
HP USB Port Manager		✓
HP User State Tool		Add-on only

Additional Windows Components	HP ThinPro	Microsoft Windows 10 IoT Enterprise 2021
HP Easy Shell		✓
Windows Media Player		✓
Microsoft Direct Access		✓
Microsoft BranchCache		✓
Microsoft AppLocker		✓
Microsoft Sideloading		✓
CyberLink Media Player		✓

NOTE: Other add-on software available (see: http://www.hp.com/support for latest list of available add-ons). Software performance and support may vary depending on customer environment and backend.

Audio/Video CODECs	HP ThinPro	Microsoft Windows 10 IoT Enterprise 2021

Technical Specifications

MP3	✓	✓
WMA stereo	✓	✓
AAC stereo & HE AAC	✓	
Microsoft AC3 encoder		✓
MPEG-1	✓	
MPEG-4 part 2 (DivX, Xvid, H.263)	✓	✓
MPEG-4 part 10 (H.264, AVC)	✓	✓
h.365/HEVC	✓	✓
WMV 7/8/9/ VC-1 & ASF Demuxer	✓	✓

Recommended TC config for Microsoft Teams media optimization

	TC CPU	VMware Teams Optimization	Citrix Teams Optimization
t655	2.10 GHz 4 Core	✓	✓

- Not recommended, ✓ recommended

WEIGHTS & DIMENSIONS

W x D x H: (vertical orientation) 35 x 200 x 200 mm

Volume: 1.4 liter

System Weight (unit with stand) 1174g
Lowest weight. Weight will vary by configuration.

Shipping Weight (System+Stand+AC+PC) 2106g

NOTE: All measurements are approximate; the addition of optional modules will increase the weight

EXTERNAL POWER SUPPLY

45W non-PFC Smart external power adapter
Worldwide auto-sensing 100 - 240 VAC; nominal voltage is 120 VAC; 50 - 60 Hz
Energy saving automatic power-down; surge tolerant
1.8m output cable

External power adapters are sourced from several suppliers in order to ensure adequate supply and availability is maintained. The actual dimensions of the power brick will vary by supplier.

HP P/N	Vendor	Dimensions:
L25296-001	Lite-On	94 x 40 x 26.5 mm

Technical Specifications

L25296-002	Chicony	95 x 40 x 26.5 mm
L25296-003	Delta	94 x 39 x 26.5 mm
L25296-004	AcBel	91.4 x 44 x 26.8 mm

Technical Specifications

COMPLIANCE/CERTIFICATIONS

Accessibility:	Section 508 Accessibility; VPAT report available.
Environmental Stewardship:	Worldwide (ENERGY STAR® configurations available, EPEAT 2.0, RoHS2, ERP, TCO Certified, CECP& SEPA, HP GSE, WEEE, Low Halogen, etc.)
Product Safety:	Worldwide (UL, CB, GS, CCC, BSMI, etc.)
Electromagnetic Compliance (EMC):	Worldwide (FCC/CISPR/EN/VCCI/ICES/AS/NZS/CNS/KCC) "Class B" EMI regulations
International Medical Safety Standard:	EN60601-1-2 (Medical Equipment EMC) passed

ENVIRONMENTAL

Operating Temperature Range:	50° to 104° F 10° to 40° C	
Non-operating Temperature Range:	-22° to 140° F -30° to 65° C	
Humidity:	Condensing: Non-condensing:	20% to 80% 10% to 90%

NOTE: Specifications are at sea level with altitude derating of 1° C/300m (1.8° F/1000ft) to a maximum of 3 Km (10,000 ft), with no direct, sustained sunlight. Upper limit may be limited by the type and number of options installed.

Basic Configuration (does not include a fiber optic NIC):

Energy Consumption	**115 V ac, 60 Hz**	**230 V ac, 50 Hz**	**100 V ac, 60 Hz**
Normal Operation (Short idle)	6.85 W	6.98 W	6.75 W
Normal Operation (Long idle)	6.48 W	6.59 W	6.26 W
Sleep	0.96 W	1.06 W	0.95 W
Off	0.80 W	0.87 W	0.77 W

Heat Dissipation*	**115 V ac, 60 Hz**	**230 V ac, 50 Hz**	**100 V ac, 60 Hz**
Normal Operation (Short idle)	23 BTU/hr	24 BTU/hr	23 BTU/hr
Normal Operation (Long idle)	22 BTU/hr	22 BTU/hr	21 BTU/hr
Sleep	3 BTU/hr	4 BTU/hr	3 BTU/hr
Off	3 BTU/hr	3 BTU/hr	3 BTU/hr

NOTE: Heat dissipation is calculated based on the measured watts, assuming the service level is attained for one hour.

System configuration includes: HP Thin Pro 64bit operating system, 128 GB storage, 32 GB system memory, USB keyboard & mouse

Optional Configuration (includes a fiber optic NIC):

Energy Consumption	**115 V ac, 60 Hz**	**230 V ac, 50 Hz**	**100 V ac, 60 Hz**
Normal Operation (Short idle)	7.19 W	7.23 W	7.16 W
Normal Operation (Long idle)	6.64 W	6.62 W	6.58 W

Technical Specifications

Sleep	0.98 W	1.03 W	0.98 W
Off	0.80 W	0.89 W	0.79 W

Heat Dissipation*	**115 V ac, 60 Hz**	**230 V ac, 50 Hz**	**100 V ac, 60 Hz**
Normal Operation (Short idle)	24 BTU/hr	25 BTU/hr	24 BTU/hr
Normal Operation (Long idle)	23 BTU/hr	23 BTU/hr	22 BTU/hr
Sleep	3 BTU/hr	4 BTU/hr	3 BTU/hr
Off	3 BTU/hr	3 BTU/hr	3 BTU/hr

NOTE: Heat dissipation is calculated based on the measured watts, assuming the service level is attained for one hour.

System configuration includes: Windows 10 IoT Enterprise LTSC 2019 operating system, 128 GB storage, 32 GB system memory, 100 Mbps SC Fiber Optic NIC, USB keyboard & mouse

Acoustic Noise Emission Declaration						
Measurement and declaration standards:	ISO 7779: Acoustics – Measurement of airborne noise emitted by information technology and telecommunications equipment					
	ISO 9296: Acoustics – Declared noise emission values of computer and business equipment					
Declared Noise Emission Values in accordance with ISO 9296						
Product Configuration or Operating Mode # (see section below for description)	Declared Sound Power Level, L_{Wad} Bels			Declared Sound Pressure Level, L_{pAm} dBA Tested on ISO Table		
	Idle	Operating		Idle	Operating	
	ECMA-74 C.15.3.2 Idle Mode	ECMA-74 C.9.3.2 Drive Random Seek	ECMA-74 C.15.3.3 g Active Mode	ECMA-74 C.15.3.2 Idle Mode	ECMA-74 C.9.3.2 Drive Random Seek	ECMA-74 C.15.3.3 g Active Mode
Vertical	2.6	2.6	2.6	13.7	13.7	13.7
Horizontal	2.6	2.6	2.6	N/A	N/A	N/A
The Product meets the acoustic noise limits of these voluntary Eco labels:				TCO Certified Blue Angel Nordic Swan EU Flower		

NOTE: Measured under ISO 7779 and ISO 9296 measurement and declaration standards.

Summary of Changes

Date of change:	Version History:	Type of change	Description of change:
October 7, 2022	From v1 to v2	Changed	PROCESSOR and MEMORY sections
October 13, 2022	From v2 to v3	Changed	PROCESSOR section
October 27, 2022	From v3 to v4	Changed	WEIGHTS & DIMENSIONS, Recommended TC config for Microsoft Teams media optimization sections
February 6, 2023	From v4 to v5	Changed	Format page 1, Storage and COMPLIANCE/CERTIFICATIONS sections