ARRIS ICX 7650

ENTERPRISE-CLASS STACKABLE ACCESS/AGGREGATION SWITCH

The ICX 7650 Switch is designed to meet the new challenges of the multigigabit wireless era. It delivers non-blocking performance, high availability, and scalability with Multigigabit Ethernet access, high PoE output as well as 10 Gigabit Ethernet Aggregation and 40G/100G uplink options.

- Dual Purpose for Premium Access or 1G/10G Aggregation Switching
- 40GBE and 100GBE for maximum Performance and Future-Proofing
  - Up to 2x 40 GbE uplink or 4x 40GbE stacking ports
  - Up to 2x 100 GbE uplink or stacking ports
- Multigigabit for 802.11AC Wave 2 Deployments and beyond
  - Up to 24x 1/2.5/5/10G Multigigabit Ethernet ports
- Redundant, load-sharing Power Supplies enhances availability Power next Generation POE Devices
  - PoE+/802.3bt* up to 90W per port
  - Up to 1500W PoE budget with two power supplies
- Advanced L3 Routing delivers Design Flexibility
  - IPv4 and IPv6
  - BGP, OSPF, VRRP, PIM, PBR, VRF
- Campus Fabric reduces cost of Operations, simplifies Management
  - Delivers the benefits of a chassis with the flexibility of distributed stacking
  - Scales to 1800 ports
- Security and Data Privacy
  - MACsec 128-bit and 256-bit data encryption ensures compliance and data confidentiality

* Up to 90W per port, IEEE 802.3bt standard pending ratification. Compatible with uPoE.

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ICX 7650 PRODUCT FAMILY

All Ruckus ICX 7650 models offer one modular slots in the front for interchangeable uplink modules, dual power supply slots, dual fan tray slots in the back, one RJ-45 Ethernet port for out-of-band network management, one USB Type-C port for console management, one RJ-45 port for serial console management, and one USB port for external file storage.

ICX 7650	
	Ruckus ICX 7650-48P • 48x 10/100/1000 Mbps RJ-45 ports with 40 supporting PoE+ and 8 supporting PoE+, UPoE and PoH • Can stack on 4x40G or 2x100G rear facing QSFP ports, these ports can also be used as 2x40G uplinks when the switch is standalone • One slot for 2x40G or 4x10G front facing module • Up to 1500W PoE budget • 2x hot-swappable load sharing power supplies and 2x hot-swappable fan assemblies with reversible airflow options
	Ruckus ICX 7650-48ZP • 24x 10/100/1000 Mbps RJ-45 PoE+ ports • 24x 100/1000 Mbps 2.5/5/10 Gbps RJ-45 PoE+/PoH/UPoE ports • Can stack on 4x40G or 2x100G rear facing QSFP ports, these ports can also be used as 2x40G or 2x100G uplinks when switch is standalone • One slot for 1x 100G or 2x40G or 4x10G front facing module • Up to 1500W PoE budget • 2x hot-swappable load sharing power supplies and 2x hot-swappable fan assemblies with reversible airflow options
	Ruckus ICX 7650-48F • 24x 100/1000 Mbps SFP ports • 24x 1000 Mbps / 10 Gbps SFP+ ports • Can stack on 4x40G or 2x100G rear facing QSFP ports, these ports can also be used as 2x40G or 2x100G uplinks when switch is standalone • One slot for 1x 100G or 2x40G or 4x10G front facing module • 2x hot-swappable load sharing power supplies and 2x hot-swappable fan assemblies with reversible airflow options
	Ruckus ICX 7650 Rear View (all models) • The four rear facing QSFP ports can be configured as follows: • 4x 40G QSFP+ stacking / 2x 40G QSFP+ uplink ports or • 2x100G QSFP28 stacking/uplink ports • Note: Front-facing optional module only enabled when rear ports are used for stacking. ICX 7650-48P only supports 2x40G rear facing uplink ports

SPECIFICATIONS

	RUCKUS ICX 7650-48P GIGABIT ACCESS	RUCKUS ICX 7650-48ZP MULTIGIGABIT ACCESS	RUCKUS ICX 7650-48F 1/10G AGGREGATION
Switching capacity (data rate, full duplex, stacking enabled)	696 Gbps	1.128 Tbps	1.128 Tbps
Forwarding capacity (data rate, full duplex, stacking enabled)	518 Mpps	839 Mpps	839 Mpps
Fixed ports: 10/100/1000 Mbps RJ45 downlinks	48	24	
Fixed ports: 100/1000 Mbps/2.5/5/10 Gbps RJ45 downlinks (full duplex only)		24	
Fixed ports: 1 Gbps SFP downlinks			24
Fixed ports: 1/10 Gbps SFP/SFP+ downlinks			24
Modular ports 1/10 Gbps	4	4	4

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SFP/SFP+ uplinks (max.)			
40 Gbps QSFP+ ports (max.)	2 Fixed[1] or 2 Modular	2 Fixed[1] or 2 Modular	2 Fixed[1] or 2 Modular
100 Gbps QSFP28 ports (max.)	2 Fixed (Stacking Only)	2 Fixed[2] or 1 Modular	2 Fixed[2] or 1 Modular
Stacking ports (max ports usable for stacking)	4×40G1 QSFP+ or 2×100G2 QSFP28		
PoE / PoE+ ports	40	40	
802.3bt ports (90 W per port)Compatible with PoE/PoE+/Cisco uPoE	8	24	
Maximum PoE Class 3 ports (15.4 W per port)	48	48	
Maximum PoE+ Class 4 ports (30 W per port)	48 (2 PSU)	48 (2 PSU)	
Base IPv4/v6 Layer 3 routing (static routing, RIP)	Standard		
Advanced IPv4/v6 Layer 3 routing (OSPF, BGP, VRRP, PIM, PBR, VRF)	With license		
Aggregated stacking bandwidth	2.4 Tbps		
Stacking density (maximum switches in a stack)	12		
Maximum stacking distance (distance between stacked switches)	10 km		
Campus Fabric	Fabric Control Bridge (CB)		

Notes:
1 Either 4x40G rear stacking ports + 2x 40G front modular uplink port, or 2x40G rear uplink ports. Front module disabled when rear ports used for uplinks
2 Either 2x100G rear stacking ports + 1x 100G front modular uplink port, or 2x100G rear uplink ports. Front module disabled when rear ports used for uplinks

POWER	RUCKUS ICX 7650-48P GIGABIT ACCESS	RUCKUS ICX 7650-48ZP MULTIGIGABIT ACCESS	RUCKUS ICX 7650-48F 1/10G AGGREGATION
Power inlet (AC)	C14		
Input voltage/frequency	AC: 100 to 240 VAC @ 50 to 60 Hz		
Power supply rated maximum	2 x 1000W		2 x 250W
PoE power budget (two power supplies)	1500 W		
Switch power consumption[3] (25°C) Idle (no PoE load) 10% traffic4 (full PoE load) 100% traffic4 (full PoE load)	66 W 895 W 901 W	111 W 944 W 951 W	82 W 197 W 216 W
Airflow	front-to-back, or back-to-front (depending on power supplies and fans installed)		
Switch heat dissipation[3, 5] (25°C) Idle (no PoE load) 10% traffic4 (full PoE load) 100% traffic4 (full PoE load)	226BTU/hour 391 BTU/hour 408 BTU/hour	381 BTU/hour 635 BTU/hour 662 BTU/hour	281 BTU/hour 676 BTU/hour 741 BTU/hour
ENVIRONMENT			
Weight[3]	7.5 kg (16.53 lb)	8.01 kg (17.66 lb)	7.6 kg (16.75 lb)
Dimensions	440mm (17.323 in.) W x 406mm (15.984 in.) D x 44mm (1.732 in.) H; 1U		
Acoustics[3] (25°C, ISO 7779)	48.3 dBA	56.4 dBA	51.3 dBA
MTBF3 (25°C)	213,026 hours	201,678 hours	243,130 hours
CAPABILITIES			
Connector options	10/100/1000 Mbps, 2.5/5/10 Gbps ports: RJ-45 100 Mbps SFP ports 1 Gbps SFP ports 10 Gbps SFP+ ports 40 Gbps QSFP+ ports 100 Gbps QSFP28 ports Out-of-band Ethernet management: 10/100/1000 Mbps RJ-45 Console management: USB type C (Type C plug) and RJ45 File Transfer: USB port, standard-A plug For the latest information about supported optics, please visit www.ruckuswireless.com/optics.		

DRAM NVRAM (flash) Packet Buffer Size	4 GB 16 GB 8 MB on ICX7650-48ZP and 48F, 5 MB on ICX7650-48P	
Maximum MAC addresses	80,000	
Maximum VLANs Maximum PVLANs	4095 256	
Maximum VEs	512	
Maximum routes (in hardware)	128K (IPv4) 7K (IPv6) 12,000 (Next Hop Addresses)	
Trunking	Maximum ports per trunk: 16 Maximum trunk groups: 256	
Maximum jumbo frame size	9,216 bytes	
QoS priority queues	10 for Unicast and Multicast traffic	
Multicast Groups	8192 (Layer 2) 8192 (Layer 3)	
VRF	50 instances	
Layer 2 switching	• 802.1s Multiple Spanning Tree • 802.1x Authentication • Auto MDI/MDIX • BPDU Guard, Root Guard • Dual-Mode VLANs • MAC-based VLANs, Dynamic MAC-based VLAN activation • Dynamic Voice VLAN Assignment • Dynamic VLAN Assignment • Fast Port Span • GVRP: GARP VLAN Registration Protocol • IGMP Snooping (v1/v2/v3) • IGMP Proxy for Static Groups • IGMP v2/v3 Fast Leave • Inter-Packet Gap (IPG) adjustment • Link Fault Signaling (LFS) • MAC Address Filtering • MAC Learning Disable	• MLD Snooping (v1/v2) • Multi-device Authentication • Per-VLAN Spanning Tree (PVST/PVST+/PVRST) • Mirroring - Port-based, ACL-based, MAC Filter-based, and VLAN-based • PIM-SM v2 Snooping • Port Loop Detection • Private VLAN • Remote Fault Notification (RFN) • Single-instance Spanning Tree • Trunk Groups (static, LACP) • Uni-Directional Link Detection (UDLD) • Metro-Ring Protocol (MRP) (v1, v2) • Virtual Switch Redundancy Protocol (VSRP) • Q-in-Q and selective Q-in-Q • VLAN Mapping • Topology Groups
Base Layer 3 IP routing	• IPv4 and IPv6 static routes • −−RIP v1/v2, RIPng • ECMP • Port-based Access Control Lists • Layer 3/Layer 4 ACLs	• Host routes • Virtual Interfaces • Routed Interfaces • Route-only Support • Routing Between Directly Connected Subnets
Premium Layer 3 IP routing (with software license)	• IPv4 and IPv6 dynamic routes • OSPF v2, OSPF v3 (IPv6) • PIM-SM, PIM-SSM, PIM-DM, PIM passive (IPv4/IPv6 multicast routing functionality) • PBR • Virtual Route Redundancy Protocol VRRP v3 (IPv6)	• VRRP-E (IPv4, IPv6) • BGP4, BGP4+ (IPv6) • GRE • IPv6 over IPv4 tunnels • VRF-lite (IPv4 and IPv6) • MSDP
Quality of Service (QoS)	• ACL Mapping and Marking of ToS/DSCP (CoS) • ACL Mapping and Marking of 802.1p • ACL Mapping to Priority Queue • Classifying and Limiting Flows Based on TCP Flags • DiffServ Support • Honoring DSCP and 802.1p (CoS)	• MAC Address Mapping to Priority Queue • Priority Queue Management using Weighted Round Robin (WRR), Strict Priority (SP), and a combination of WRR and SP • Priority Flow Control
Traffic management	• ACL-based inbound rate limiting and traffic policies • Broadcast, multicast, and unknown unicast rate limiting	• Inbound rate limiting per port • Outbound rate limiting per port and per queue
Security	• MACsec • 802.1X authentication • MAC authentication • Flexible authentication • Web authentication • DHCP snooping • Dynamic ARP inspection • Neighbor Discovery (ND) Inspection • Tri-level Access Mode (EXEC, Privileged EXEC and Global Configuration) • EAP pass-through support	• MAC Address Locking MAC Port Security • Advanced Encryption Standard (AES) with SSHv2 • RADIUS/TACACS/TACACS+ • Secure Copy (SCP) • Secure Shell (SSHv2) • Local Username/Password • Change of Authorization (CoA) RFC 5176 • Trusted Platform Module • Protected ports • RADSEC (RFC 6614) • Encrypted Syslog (RFC 5425)

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	• EEE 802.1X username export in sFlow • Protection against Denial of Service (DoS) attacks Authentication, Authorization, and Accounting (AAA)	
SDN features	• OpenFlow v1.0 and v1.3 • OpenFlow with hybrid port mode	• Operates with OpenDaylight SDN Controllers and the applications running on the controller
IEEE standards compliance	• 802.1AB LLDP • 802.1D MAC Bridging • 802.1p Mapping to Priority Queue • 802.1s Multiple Spanning Tree (MST) • 802.1w Rapid Reconfiguration of Spanning Tree • 802.1x Port-based Network Access Control (PNAC) • 802.3 Carrier Sense Multiple Access/Collision Detection (CSMA/CD) • 802.3ab 1000BASE-T • 802.1 AX-2008 Link Aggregation • 802.3ae 10 Gigabit Ethernet • 802.3af Power over Ethernet	• 802.3at Power over Ethernet Plus • 802.3bt 4-Pair Power over Ethernet (IEEE ratification pending) • 802.3u 100Base-TX • 802.3x Full duplex and Flow Control • 802.3z 1000Base-SX/LX • 802.3 MAU MIB (RFC 2239) • 802.3ba 40 and 100 Gbps Ethernet • 802.1AE-MACsec* (with license) • 802.3az Energy Efficient Ethernet • 802.1Q VLAN Tagging • 802.1BR Bridge Port Extension
IETF RFC standards compliance	For a complete list of RFCs supported by the Ruckus FastIron® software platform, please consult the “FastIron Features and Standards Support Matrix” document available from support.ruckuswireless.com.	
High availability	• Redundant hot-swappable power supplies • Hot-swappable fan trays • Layer 3 VRRP/VRRP-E protocol redundancy • Real-time state synchronization across the stack	• Hitless failover and switchover from master to standby stack controller • Hot insertion and removal of stacked units • Layer 2 VSRP switch redundancy • In Service Software Update (ISSU)
Management	• DHCP Auto Configuration • Configuration Logging • Digital Optical Monitoring • Display Log Messages on Multiple Terminals • Embedded Web Management (HTTP/HTTPS) • Embedded DHCP Server • Industry-standard Command Line Interface (CLI) • Ruckus SmartZone Network Controller (sold separately) • Easy activation of optional software features • USB file management and storage • Boot from USB storage • Macro for batch execution • Out-of-band Ethernet Management • ERSPAN support for remote traffic monitoring • RSPAN • TFTP • TELNET Client and Server	• Bootp SNMPv1/v2c • DHCP Server and DHCP Relay • SNMPv3 Intro to Framework • Architecture for Describing SNMP Framework • SNMP Message Processing and Dispatching • SNMPv3 Applications • SNMPv3 User-based Security Model • SNMP View-based Access Control Model SNMP • sFlow • Network Time Protocol (NTP) • Multiple Syslog Servers • SCP • EOAM (EFM-OAM) • Virtual Cable Tester (VCT) • For Management MIB, please consult the “FastIron MIB Reference” document available from support.ruckuswireless.com.
ENVIRONMENT		
Temperature	Operating temperature: 0°C to 45°C/32°F to 113°F at sea level Storage temperature: −40°C to 70°C/−40°F to 158°F	
Humidity	Operating relative humidity: 10% to 90% at 50°C, non-condensing Non-operating relative humidity: 5% to 95% at 70°C, non-condensing	
Altitude	Operating altitude: 10,000 ft. (3,000 m) maximum Storage altitude: 39,000 ft. (12,000 m) maximum	
COMPLIANCE/CERTIFICATION		
Electromagnetic emissions	FCC Class A (Part 15); EN 55022/CISPR-22 Class A; VCCI Class A; ICES-003 Electromagnetic Emission; AS/NZS 55022; EN 61000-3-2 Power Line Harmonics; EN 61000-3-3 Voltage Fluctuation and Flicker EN 61000-6-3 Emission Standard	
Safety	CAN/CSA-C22.2 NO. 60950-1-07; UL 60950-1; IEC60950-1; EN 60950-1:2006 Safety of Information Technology Equipment; EN 60825-1 Safety of Laser Products	
Immunity	EN 61000-6-1 Generic Immunity and Susceptibility; EN 55024 Immunity Characteristics; EN 61000-4-3 Radiated, Radio Frequency, Electromagnetic Field; EN 61000-4-4 Electrical Fast Transient; EN 61000-4-5 Surge; EN 61000- 4-6 Conducted Disturbances Induced by Radio-Frequency Fields; EN 61000-4-8 Power Frequency Magnetic Field; EN 61000-4-11 Voltage Dips and Sags	

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Environmental regulatory compliance	RoHS-compliant (6 of 6); WEEE-compliant
Vibration	IEC 68-2-36, IEC 68-2-6
Shock and drop	IEC 68-2-27, IEC 68-2-32

ORDERING INFORMATION

PART NUMBER	SWITCH BUNDLES
ICX7650-48ZP-E	48-port; 24-port 100MbE/1GbE/2.5GbE/5Gb E/10GbE POH, 24-port 1 GbE switch PoE+, 4xQSFP (either 2x100G or 4x40G active), modular slot. Bundle includes one 1000W AC power supply and one fan, front to back airflow, port modules sold separately.
ICX7650-48P-E	48-port 1 GbE switch PoE+, 4xQSFP (either 2x100G or 4x40G active), modular slot. bundle includes one 1000W AC power supply and one fan, front to back airflow, port modules sold separately.
ICX7650-48F-E	48-port; 24-port 1/10GbE SFP+, 24-port 1 GbE SFP, 4xQSFP (either 2x100G or 4x40G active), modular slot. fiber switch bundle includes one 250W AC power supply and one fan, front to back airflow, port modules sold separately.
ICX7650-48ZP-E2	48-port; 24-port 100MbE/1GbE/2.5GbE/5Gb E/10GbE POH, 24-port 1 GbE switch PoE+, 4xQSFP (either 2x100G or 4x40G active), modular slot bundle includes two 1000W AC power supplies and two fans, front to back airflow, port modules sold separately.
ICX7650-48P-E2	48-port 1 GbE switch PoE+, 4xQSFP (either 2x100G or 4x40G active), modular slot bundle includes two 1000W AC power supplies and two fans, front to back airflow, port modules sold separately.
ICX7650-48F-E2	48-port; 24-port 1/10GbE SFP+, 24-port 1 GbE SFP, 4xQSFP (either 2x100G or 4x40G active), modular slot fiber switch bundle includes two 250W AC power supplies and two fans, front to back airflow, port modules sold separately.
PART NUMBER	**SWITCH BUNDLES WITH 3 YEARS REMOTE SUPPORT**
ICX7650-48ZP-E-RMT3	48-port; 24-port 100MbE/1GbE/2.5GbE/5GbE/10GbE POH, 24-port 1GbE switch PoE+, 4xQSFP (either 2x100G or 4x40G active), modular slot bundle includes one 1000W AC power supply and one fan, front to back airflow, port modules sold separately, 3 years 24x7 remote support.
ICX7650-48P-E-RMT3	48-port 1 GbE switch PoE+,4xQSFP (either 2x100GbEor 4x40GbE active), modular slot bundle includes one1000W AC power supply and one fan, front to back airflow, port modules sold separately, 3 years 24x7remote support..
ICX7650-48F-E-RMT3	48-port; 24-port 1/10GbE SFP+, 24-port 1 GbE SFP, 4xQSFP (either 2x100G or 4x40G active), modular slot fiber switch bundle includes one 250W AC power supply and one fan, front to back airflow, port modules sold separately, 3 years 24x7 remote support.
PART NUMBER	**BARE SWITCHES**
ICX7650-48ZP	48-port switch: 24-port 100MbE/1GbE/2.5GbE/5GbE/10GbE POH and 24-port 1GbE. PoE+, 4xQSFP (either 2x100G or 4x40G active), modular slot, no PSU, no fans, no port module.
ICX7650-48P	48-port 1 GbE switch PoE+, 4xQSFP (either 2x100G or 4x40G active), modular slot, no PSU, no fans, no port module.
ICX7650-48F	48-port; 24-port 1/10GbE SFP+, 24-port 1 GbE SFP, 4xQSFP (either 2x100G or 4x40G active), modular slot fiber switch, no PSU, no fans, no port module.
PART NUMBER	**POWER SUPPLIES AND FANS**
RPS15-E	ICX7650/7450/6610/6650 NON-POE 250W AC PSU, exhaust airflow, front to back airflow
RPS15-I	ICX7650/7450/6610/6650 NON-POE 250W AC PSU, intake airflow, back to front airflow
RPS16-E	ICX7650/7450/6610 POE 1000W AC PSU, exhaust airflow, front to back airflow
RPS16-I	ICX7650/7450/6610 POE 1000W AC PSU, intake airflow, back to front airflow
RPS16DC-E	ICX 7650/7450/6610 POE 510W DC PSU, exhaust airflow, front to back airflow
RPS16DC-I	ICX 7650/7450/6610 POE 510W DC PSU, intake airflow, back to front airflow
ICX-FAN12-E	ICX 7650 exhaust airflow fan, front to back airflow (two fans required when using two power supplies)
ICX-FAN12-I	ICX 7650 intake airflow fan, back to front airflow (two fans required when using two power supplies)
PART NUMBER	**PORT MODULES**
ICX7650-1X100GQ	ICX 7650 1-port 100GbE QSFP28 Module
ICX7650-2X40GQ	ICX 7650 2-port 40GbE QSFP+ Module
ICX7650-4X10GF	ICX 7650 4-port 1/10GbE SFP+ Module
PART NUMBER	**FEATURE LICENSE AND ACCESSORIES**
ICX7650-PREM-LIC	ICX 7650 advanced L3 License adds support for OSPF, BGP VRRP, PIM, PBR, VRF
ICX-MACSEC-LIC	ICX MACsec license adds support for 128/256 bit MACsec encryption to ICX 7650
ICX7000-RMK	FRU, RACK MOUNT KIT,2 POST ICX7000 SERIES
XBR-R000295	FRU, RACK MOUNT KIT,4 POST 24-32 DEPTH RCK

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