

## TR-CES2716 Series



### Industrial Grade Carrier Ethernet Series

#### Product Overview

Techroutes CES2716 series—the industrial carrier Ethernet switches are small but power full switches designed for carrier 3G/4G backhaul networks with the unified operation, the equipment can make better use of themselves. TR-CES2716 series adopt patented ORING+™ self-healing rings. Its hardware-based algorithm ensures the failover time in every node less than 5ms and the network self-healing time less than 50ms (typical value).TR-CES2716 also supports IEC62439-2 based MRP,IEC62439-3 based PRP, and HSR.TR-CES2716 switches adopt the half-rack frame and support 16 Ports out of which 8 10/100/1000M electrical ports and 8 100/1000M SFP slots or 4 10/100/1000M electrical ports and 12 100/1000M SFP slots which makes network establishment more flexible and prompt.TR-CES2716 Switches designed to withstand in harsh environment, the fan less design switch supports operational temperature range of - 40°C to 70°C

#### Performance Features

- Supporting IEC61850-3 and IEEE1613
- Supporting transmits multicast packets such as packets about IEC 61850 GOOSE or sampling values.
- Supporting ORING+™ based Ethernet ring and multiple self-healing rings with the fail-over time in every node less than 5ms and the network self-healing time less than 50ms (typical value)
- Supporting IEEE1588V2(PTP) , Boundary Clock (BC),E2E transparent clock, and P2P transparent clock (TC)
- Supporting IEC62439-2 based MRP
- Any two ports can establish a self-healing ring and support multiple independent self-healing rings with function of data packet dropout protection and quick recover from network failure.
- Supporting various multicast protocols and strong safety protection mechanism
- Providing bandwidth service with different levels in Ethernet service by speed limiting and traffic shaping in QoS of layer 2
- Supports Auto Provisioning
- Supporting function of the static and dynamic allocation as well as limitation of CPU and real-time monitor the key operating parameters, including CPU utilization rate,RAM, supply voltage and mainboard voltage.

- TR-CES-2716 series have a full set of professional network management and monitoring and alarm system. And they also support OPC.
- Adopting redundant dual power input design

### Technical Specifications

Hardware Specification	
Backplane bandwidth:	52Gbps
CPU:	600MHz RISC
Switching technique:	ASIC based parallel store and forward
MAC address table:	8K
Buffer:	1.5M (Min)
Exchange rate:	148,800 pps/100M ports
	1,488,000 pps/1000M ports
Software Features	
Ethernet Standards	IEEE 1588v2 with one-step clock support
	IEEE 802.3 CSMA/CD method and physical Layer specifications
	IEEE 802.1p Priority Queuing
	IEEE 802.1q VLAN tagging
	IEEE 802.1d Spanning Tree Algorithm
	IEEE 802.1w Rapid Spanning Tree
	IEEE 802.1s Multiple Spanning Tree
	IEEE 802.3ac VLAN Tagging
	IEEE 802.1x Authentication
	IEEE 802.3ad Link Aggregation
	IEEE 802.3x Flow Control
	IEEE 802.3 Ethernet
	IEEE 802.3u Fast Ethernet
	IEEE 802.3z Gigabit Ethernet
	IEEE 802 Networks
MAC exchange	Static configuration and dynamic MAC learning
	MAC browsing and removal
	Configurable aging time of the MAC address
	Limited number of learnable MAC addresses
	MAC filtration
	Black-hole MAC list
VLAN	4K VLAN
	GVRP
	1:1 VLAN mapping and N:1 VLAN mapping
	QinQ and flexible QinQ
	PVLAN

Multicast	802.1D (STP), 802.1W (RSTP) and 802.1S (MSTP)
	BPDU protection, root protection, and loopback protection
	IGMP v1/v2/v3
	IGMP snooping
	IGMP Fast Leave
	Multicast group strategy and quantity limitation
	Multicast flow copying over VLANs
IPv6	ICMPv6, DHCPv6, ACLv6 and IPv6 Telnet
	IPv6 neighbor discovery
	Path MTU discovery
	MLD V1/V2
	IGMP snooping
QoS	Flow classification based on L2~4 protocols
	CAR flow limit
	802.1P/DSCP priority re-labeling
	SP, WRR, and "SP+WRR"
	Congestion avoidance mechanisms like Tail-Drop and WRED
	Flow monitoring and flow shaping
Security	L2/L3/L4 ACL flow identification and filtration
	DDoS attack prevention, TCP's SYN Flood attack prevention, UDP Flood attack prevention, etc
	Broadcast/multicast/unknown unicast storm-control
	Port isolation
	Port security, and "IP+MAC+port" binding
	DHCP snooping and DHCP option 82
	IEEE 802.1x authentication
	Radius BDTacacs+ authentication
	Level-based command line protection
	Functional redundancy
Others	IPv4/IPv6 multicast, storm control,MC/BC protection, support Jumbo Frame, ZTP
Time synchronization:	IEEE1588v2 (BC and TC), NTP,SNTP
Reliability	Static/LACP link aggregation
	EAPS and ERPS
	ISSU uninterrupted system upgrade
Management	Console, Telnet, SSH, Web
	SNMP v1/v2/v3
	TFTP
	RMON
<b>Physical Performance</b>	
MTBF	more than 800,000 hours
Storage temperature	-40oC ~ 85oC

Operating temperature	-40oC ~ 75oC
Humidity	5% ~ 95%,non-condensation
Product size	220x150x44 mm , 220x250x44 mm ( CES2716UP)
Protection grade	IP40
Weight	3.7kg (Max)
Power	70W (Max)
<b>Mechanical Features</b>	
Vibration	IEC 60068-2-6
Impact	IEC 60068-2-27
Free- falling:	IEC 60068-2-32
Circuit board:	Approved by IPC
<b>Electromagnetic Characteristics</b>	
Electromagnetic radiation	FCC 47 CFR Part 15 Class A EN55022 Class A
Electromagnetic compatibility	IEC(EN)61000-4-2,Cass 4
	IEC(EN)61000-4-3,Class 4
	IEC(EN)61000-4-4,Class 4
	IEC(EN)61000-4-5,Class 4
	IEC(EN)61000-4-6,Class 4
	IEC(EN)61000-4-9,Class 4
<b>Industry standards and Testing</b>	
Product safety:	CE
	EN60950-1
	FCC
Dangerous area	UL/cUL1604 Class 1 Div 2
Power Industry	IEC61850-3 IEEE1613 (C37.90.x)

**Ordering Information**

Techroutes CES2716 Series	
Item	Description
TR-CES2716	Industrial grade Carrier Ethernet Layer-2 Switch with 8 x Gigabit TX ports, 8 100M/1000M auto-adaptive SFP ports and 1 SD slot. The hardware supports IEEE1588v2; up to IP40 protection grade; one-way power supply (88~300VDC or 90~264VAC). Dimension 220x150x44 mm (Accessories need to be configured independently)
TR-CES2716-DC	Industrial grade Carrier Ethernet Layer-2 Switch with 8 gigabit TX ports, 8 100M/1000M auto-adaptive SFP ports and 1 SD slot. The hardware supports IEEE1588v2; up to IP40 protection grade; two-way redundancy power supply (18~60VDC) 70W. Dimension 220x150x44 mm (Accessories need to be configured independently).
TR-CES2716-P-DC	Industrial grade Carrier Ethernet Layer-2 Switch with 8 gigabit TX ports (supports 802.3af/at Ethernet power supply), 8 100M/1000M auto-adaptive SFP ports and 1 SD slot. The hardware supports IEEE1588v2; up to IP40 protection grade; two-way redundancy power supply (44~57VDC). Dimension 220x150x44 mm (Accessories need to be configured independently)
TR-CES2716-L4P-DC	Industrial grade Carrier Ethernet Layer-2 Switch with 4 gigabit TX ports (supports 802.3af/at Ethernet power supply), 12 x 100M/1000M auto-adaptive SFP ports and 1 SD slot. The hardware supports IEEE1588v2; up to IP40 protection grade; two-way redundancy power supply (18~60VDC) 70W. Dimension 220x150x44 mm (Accessories need to be configured independently).
TR-CES2716-L4-UP	Industrial grade Carrier Ethernet Layer-2 Switch with 4 gigabit TX ports, 12 x 100M/1000M auto-adaptive SFP ports and 1 SD slot. The hardware supports IEEE1588v2; up to IP40 protection grade; support AC and DC power supply (44~57VDC and 100~240VAC) 70W. Dimension 220x150x44 mm (Accessories need to be configured independently).