

HSR-PRP Switch IP Core

Low-latency switch in your equipment using a single FPGA

General description

HSR-PRP Switch is an IP Core for the implementation of High-availability Seamless Redundancy and Parallel Redundancy Protocol (HSR and PRP, IEC 62439-3-Clause 5 and 4 respectively) protocols for Reliable Ethernet communications.

HSR-PRP Switch is a full hardware solution that can be implemented on a low-cost FPGA. It is a flexible solution for the Energy Market Equipments that will be connected to HSR rings, PRP Lans or will work as Network bridges.

Thanks to **SoCe** proprietary duplicate/circulate discard table analysis mechanism this IP offers very reduced latency times. Standard version of **HSR-PRP Switch** implements RedBox topology. Thus, the functionality of the three Ethernet ports are:

- Two ports (Port A and Port B) implement Dual Attached Node (DAN) capability. They connect the equipment to a ring topology network and they process HSR or PRP redundant frames
- The remaining port (Port C) offers a conventional Ethernet link to any on-board or external CPU



HSR-PRP Switch Reference Design is implemented on a Xilinx Spartan-6 LX45 device with the following results:

- Switching time of $\approx 3 \mu\text{s}$
- Less than the 50% of the logic resources of the LX45 device for RedBox implementation
- Scalable duplicate/circulate discard table

Applications

HSR-PRP Switch may be used in a wide range of products and applications. It offers a simple way to introduce Redundancy capabilities. Thanks to the use of Reconfigurable Logic, **HSR-PRP Switch** allows full upgradability and protocol combination.



- Equipments for Energy Market
- Electric Substations (IEC 61850)



- Industrial Networking
- Transport
- Defence and Aerospace

Standard package features

HSR-PRP Switch standard package includes the following items:

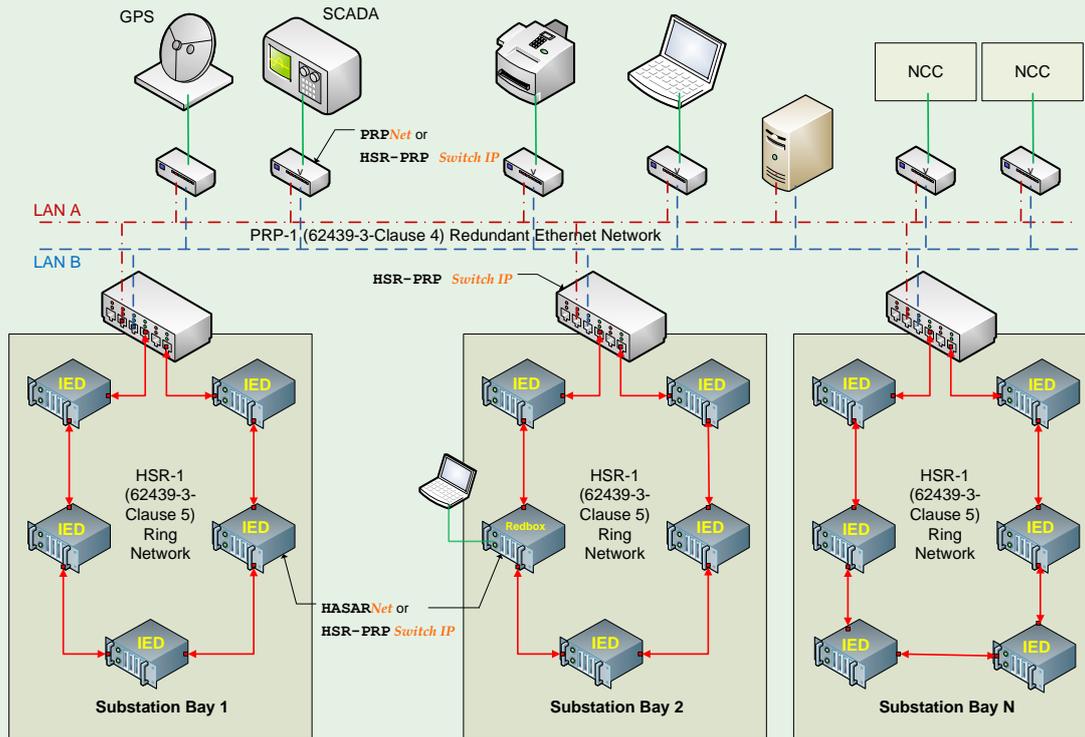
- Reference design for Xilinx SP605 Spartan-6 Evaluation Board
- Reference design for Avnet Spartan-6 Industrial Kit Board
- MII interface implemented for each Ethernet Port

SoCe offers the following engineering services related to this product:

- IEEE 1588 V2 support via **SoCe** IEEE 1588 V2 solutions
- Combination with third-party IPs
- FPGA and board custom design



Application examples



A simple HSR network consists of doubly attached bridging nodes, each having two ring ports, so nodes are restricted to be HSR-capable bridging nodes.

The network topology used in HSR does not allow singly attached nodes directly attached to the ring due to they are provided only with one port. To overcome this limitation, they can be attached through a Redundancy Box. This module acts as a proxy for the singly attached nodes connected to it.

PRP implements redundancy functions in the end nodes rather than in network elements (Dual Attached Nodes- DANs). These nodes allow high availability connection between critical equipments and critical applications.

The two Ethernet networks (LAN A and LAN B) are independent. DAN nodes connect to both LANs and send the same frames over both networks. Destination nodes consume the first received frame and discard the duplicates.

About the company

SoCe offers specialized design services of FPGAs, SoPCs, IPs and embedded systems. It focuses on FPGA based Ruggedized Systems, Industrial Networking and Video processing.

Ordering information and contact

For any further question, ordering information or quotation contact **SoCe**:

soceindustrial@soc-e.com

System-on-Chip engineering

Zitek Bilbao (ETSI)

Alameda Urquijo s/n

48013 Bilbao SPAIN

Tlf: +34 944420700