

— Designed with ISAS/JAXA and Osaka Univ. —

- ▶ Support 2 SpaceWire ports.
- ▶ Compatible for Raspberry Pi3 extension boards
  - Operate without Raspberry Pi with standalone FPGA IP
  - Stack Raspberry Pi compatible extension boards
- ▶ Build High reliability, Low cost and Flexible network system
  - Mounted low cost connectors RJ45 as SpaceWire connectors and MDM connector ready
  - Provide sample software and FPGA IPs
    - FPGA\_IP (SpaceWire IP, Router IP, I/O IP, Control IP etc.)
    - Sample source code
  - Use as low cost educational board to learn SpaceWire

\* ISAS : Institute of Space and Astronautical Science  
 JAXA : Japan Aerospace Exploration Agency

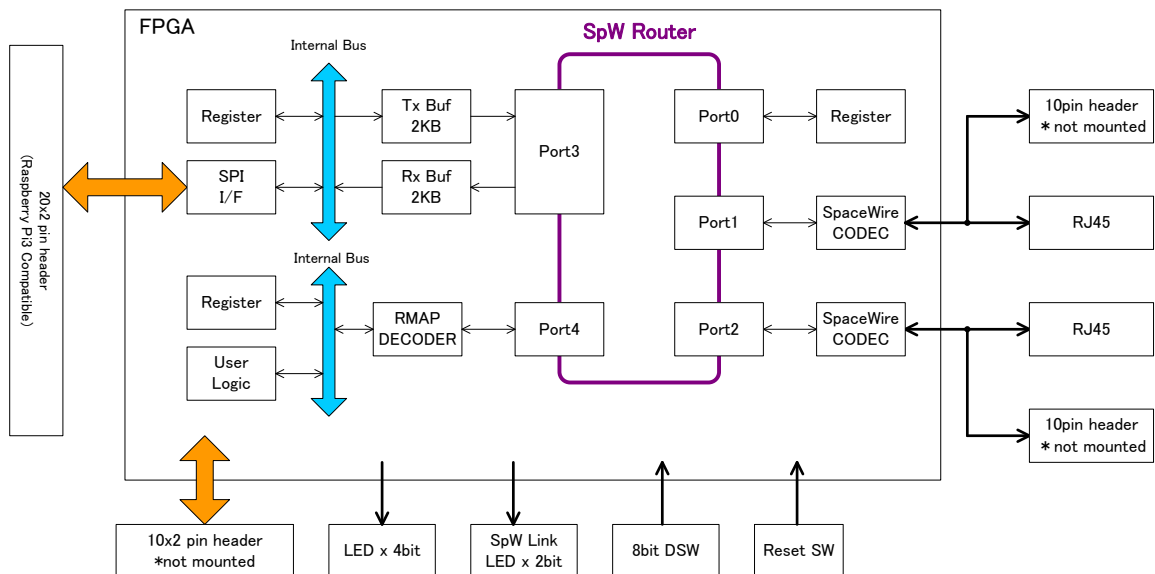
## < Specification >

FPGA	Spartan-6(XC6SLX16-2FTG256I)
SpaceWire	2 Port Link Speed : 50Mbps (MAX)
Raspberry Pi I/F	SPI
LED	General : 4 SpW Link : 2 Power : 1
Switch	8bit DipSW : 1 (General) Push SW : 1(Reset)
Size	65 (W) mm × 56 (D) mm
Power source	+5V (Supplied by Raspberry Pi or AC Adapter) * AC adapter is option



Stack SpaceWire Pi on Raspberry Pi

## < Block Diagram >



# Overview

## Space Pi Over View

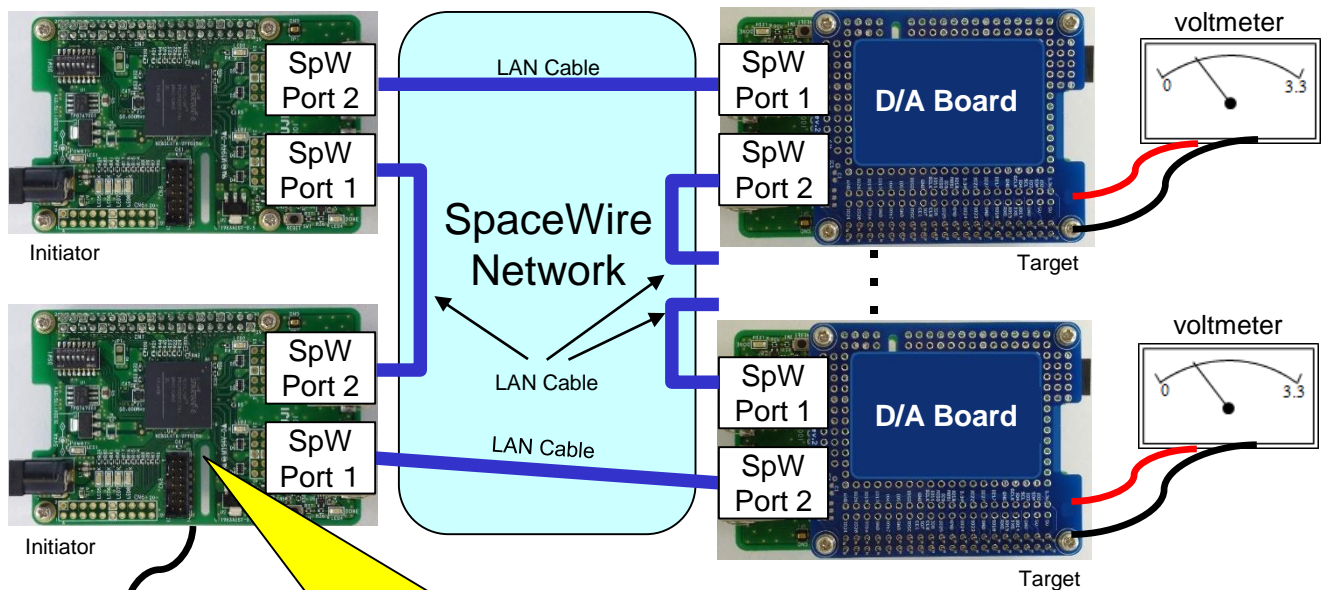
The Space Pi is the SpaceWire interface board could stack onto Raspberry Pi3 and connect through SPI. The Space Pi works as SpaceWire interface (initiator) with the implemented logic IP connect Raspberry Pi3 to the SpaceWire network. It also works as SpaceWire interface (target) with Raspberry Pi3 various extension boards.

- Initiator : Raspberry Pi3 and Space Pi
- Target : Space Pi and various extension boards for Raspberry Pi3

# Connection

## Ex. Network structure

Easy to realize high speed, high reliability and high spec. SpaceWire network system. Build budget SpaceWire network system using LAN cables (CAT.7) as SpaceWire cables.



The initiator control the target through SpaceWire network.  
Ex. : Control output voltage on the D/A board from initiator.

\* LAN Cable: CAT7 straight

# Sample

## Provide sample code for FPGA & Software

\* Some samples are binary only

Provide the sample code to build SpaceWire networks easily. (include above example)

- FPGA
  - Initiator IP / Target IP
- SOFTWARE ( Raspberry Pi )
  - SpaceWire packet ( RMAP packet ) Generate / transmit software
  - SPI control software for Target board (FPGA)