Austrian Aerospace

EADS ASTRIUM

University of Dundee — Applied Computing

SpaceWire Router (SPROUT) ASIC Features and Status

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Contents

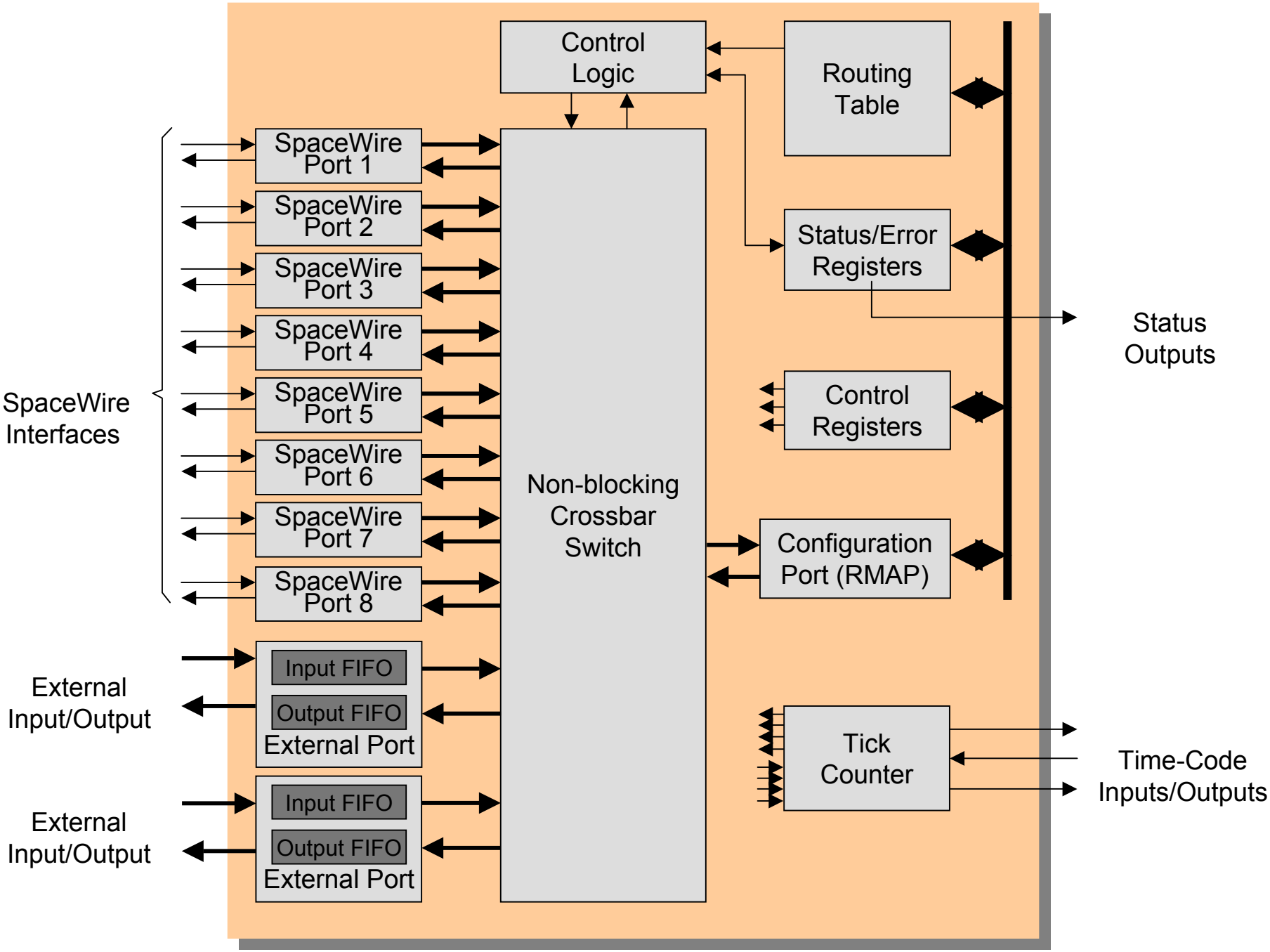
- Features
- RMAP Implementation
- Status

SPROUT ASIC Features (1)

- Fully SpaceWire compliant
- Eight SpaceWire ports
- Two External (Parallel) ports
- Time-code interface
  - Receiving time-codes
  - Generating time-codes
- Cascadable

SPROUT ASIC Features (2)

- Internal configuration port
  - Accessible through SpaceWire or External ports
  - Logical address routing table
  - Control registers
  - Status registers
  - RMAP compliant
- External pins for status/error monitoring
- External pins for start-up configuration


Control Logic
Routing Table
SpaceWire Port 1
SpaceWire Port 2
SpaceWire Port 3
SpaceWire Port 4
SpaceWire Port 5
SpaceWire Port 6
SpaceWire Port 7
SpaceWire Port 8
Status/Error Registers
Status Outputs
SpaceWire Interfaces
Control Registers
Non-blocking Crossbar Switch
Configuration Port (RMAP)
Input FIFO
Output FIFO
External Port
External Input/Output
Input FIFO
Output FIFO
External Port
External Input/Output
Tick Counter
Time-Code Inputs/Outputs

SPROUT RMAP Implementation (1)

- Partial Implementation
- Supported RMAP Operations
  - Read from single address
  - Read with address increment
  - Write to single address, acknowledged and verified
  - Read-Modify-Write
- Excluded RMAP Operations
  - Write to single address, not acknowledged or not verified
  - Write with address increment

SPROUT RMAP Implementation (2)

- 32 Bit Access for all Commands
- Addressing of Commands
  - Path Addressing must be used for Destination (Address Zero)
  - Destination Logical Address must be 254 (FEhex)
  - Zero as Source Path Address is not allowed
  - Leading Zeros as Source Path Address are ignored
- Destination Key
  - Default Value is 31 (20hex)
  - Programmable via Register

SPROUT RMAP Implementation (3)

- Implementation in Atmel MH1RT ASIC Technology
  - Total size ~9000 sites (~7000 gates)
  - Total ~270 FFs
  - Increase in size by ~200% compared to previous (simple) SPROUT protocol
  - RMAP protocol handler occupies < 3% of the total SPROUT area

SPROUT ASIC Status (1)

- RMAP Requirements have been included into the Functional Specification
- RTL code has been updated with the functions for RMAP
- Functional verification is currently ongoing
- FPGA implementation is currently ongoing
- FPGA will be tested in system environment by Astrium (planned to be finished in September)

SPROUT ASIC Status (2)

- First ASIC Prototypes are expected Q1 / 2006
- Prototypes will be tested in system environment by Astrium
- Available directly from ATMEL as an Application Specific Standard Product
- Technical support from Star Dundee (UK)