SpaceWire-PnP: A Quick Refresher

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Agenda

- Requirements and aims
- SpaceWire-PnP services
- Extensibility and capabilities

- Known issues

SpaceWire-PnP Aims

- Protocol aims
  - Interoperability and reuse
  - Standard mechanisms for standard features
  - Support device/network discovery as required by SOIS
- Document aims
  - A complete solution
  - A starting point for discussion

Perspective

- PnP views the network like the SpaceWire standard
  - Links
  - Nodes
  - Routers

    } Devices
- No topology restrictions
- Both nodes and routers have links
  - Nodes have 1 or more links
  - Routers have 2 or more links
- Every device on the network has a port zero
  - This is the target for PnP transactions

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Levels of Support

- Managed Networks
  - Important role for system designer
  - Competition during discovery process removed by design
  - Competition for configuration of devices removed by design
  - Simplest case

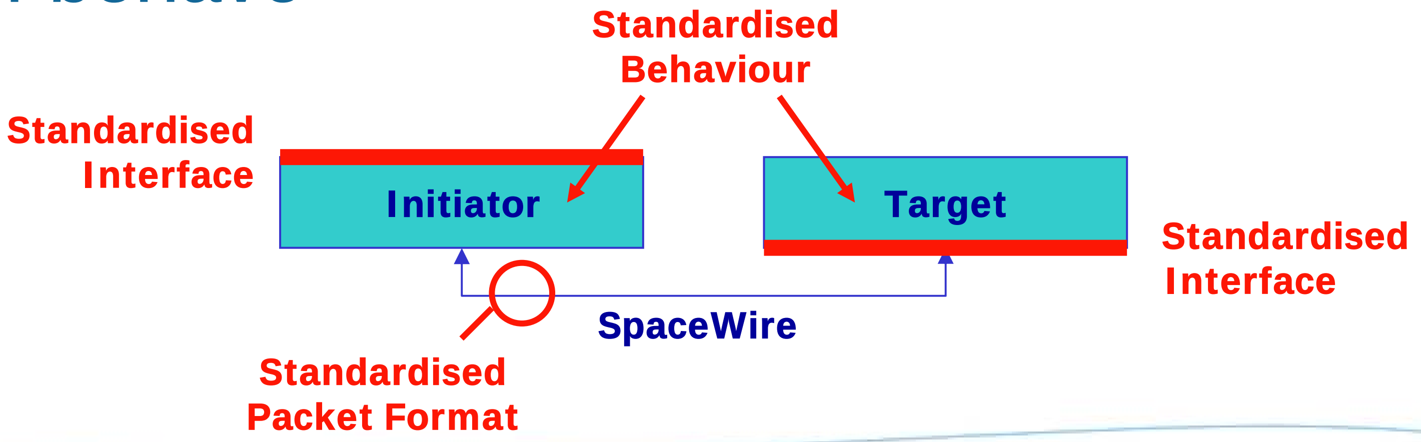
Level 1

- Open Networks
  - Network handles all competition issues
  - Deals with networks where design is **not** known *a priori*
  - More flexible but more complicated

Level 2

What is Standardised?

- A set of parameters on the target
  - This is a standardised RMAP address space
- An interface of primitives at the initiator
  - Satisfying the requirements for SOIS
- A description of how the initiator and target will both behave



Core Services

- Four core services defined
  - Device Identification
    - Read-only, constant fields
    - A few, mirrored, read-only dynamic fields
  - Network Management

Basic discovery

Satisfies SOIS

  - Link Configuration
    - All devices
  - Router Configuration
    - Routers only

Necessary for SpaceWire-specific configuration

- Optionally, there is also a time-code source

SpaceWire-PnP Extensibility

- SpaceWire-PnP is a convenient mechanism for detecting and configuring
- Can it be used as a “gateway” to more functionality?
- Devices can define their **capabilities**
  - Identifiable feature set
  - Supported by a SpaceWire-PnP service
    - Parameters
    - Primitives
    - Permits identification and configuration of the capability

Capabilities

- Device can provide a list of *capabilities*
- Capabilities based on protocol ID
  - A protocol which is supported
  - Optionally “transported” over another protocol
  - Supports nesting of “transports”
- Examples
  - CPTP over SpaceWire-(R)T
  - A standardised address space “transported” over RMAP

Describing RMAP Address Spaces

- SpaceWire-PnP document proposes a method for describing RMAP address spaces
- Capability services allow the description of:
  - Memory regions which exist to receive data: **data sinks** (e.g. actuators)
  - Memory regions which permit access to generated data: **data sources** (e.g. sensors)
- Also permits non-trivial access mechanisms
  - Delayed response reads and writes
  - Initiated reads and writes

Summarising SpaceWire-PnP

- Protocol utilising RMAP
- UoD document available: SpaceWire-PnP v2.1
  - Since February 2010
- Defines
  - Target parameters
  - Initiator primitives (service interface)
  - Behaviours (algorithms) where necessary
- Simple
- Does not require extra feature support
- Flexible and extensible
  - Can use capability services to extend support

Where next?

- Feedback on the document from the community
    - Just level 1 (?)
- Turn feedback into proposed revisions

- Bread-boarding/prototyping
    - Already some work done by SciSys, Aeroflex Gaisler and others

Known Issues (1/3)

- Need for clarification and further investigation
  - Capabilities
  - All of level 2

- Points added pending changes/clarifications to SpaceWire standard
  - Time-code sources
  - Interrupt handling

Known Issues (2/3)

- Standard way to handle not-implemented parameters/fields
  - Not clear at the moment
- Defined way to handle vendor-specific additions
- What about “dead space” in the memory map
  - Is it safe to read and ignore this?
  - Should there always be no side-effects on read?
    - This also relates to the ability to retry

Known Issues (3/3)

- Issues with particular fields, e.g.
  - Mirrored fields
  - Region field
  - Port types
  - Link errors
  - Link state ... and more
- Terminology
  - Links, ports, nodes, routers, services
  - Needs to align with updates to standard and to SOIS