

P2654 STAM WG Meeting #77

Ian McIntosh, Leonardo



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**IEEE P2654
System Test Access Management
Ian McIntosh (chair)**

Working Group Meeting #77

Date: 2020-08-31

Author(s):

Name	Affiliation	Phone [optional]	Email [optional]
Ian McIntosh	Leonardo		

2. Agenda

1. Roll Call
2. Agenda
3. IEEE Patent and Copyright Slides
4. Review and approve previous minutes: August 24
5. Review open action items
6. Inter-group Collaboration
7. Discussion Topics:
 - a. Discussion of perspectives on STAM
 - b. Diagrams and Terms
8. Any other business
9. Key Takeaways from today's meeting
10. Glossary terms from this meeting
11. Schedule next meeting
12. Topic for next meeting
13. Reminders
14. List new action items
15. Adjourn

Participants have a duty to inform the IEEE

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**Early identification of holders of potential
Essential Patent Claims is encouraged**

Ways to inform IEEE

- Cause an LOA to be submitted to the IEEE-SA (patcom@ieee.org); or
- Provide the chair of this group with the identity of the holder(s) of any and all such claims as soon as possible; or
- **Speak up now and respond to this Call for Potentially Essential Patents**

If anyone in this meeting is personally aware of the holder of any patent claims that are potentially essential to implementation of the proposed standard(s) under consideration by this group and that are not already the subject of an Accepted Letter of Assurance, please respond at this time by providing relevant information to the WG Chair

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 - Relative costs of different technical approaches that include relative costs of patent licensing terms may be discussed in standards development meetings.
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 - Don't discuss or engage in the fixing of product prices, allocation of customers, or division of sales markets.
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Patent-related information

The patent policy and the procedures used to execute that policy are documented in the:

- ***IEEE-SA Standards Board Bylaws***
(<http://standards.ieee.org/develop/policies/bylaws/sect6-7.html#6>)
- ***IEEE-SA Standards Board Operations Manual***
(<http://standards.ieee.org/develop/policies/opman/sect6.html#6.3>)

Material about the patent policy is available at

<http://standards.ieee.org/about/sasb/patcom/materials.html>

**If you have questions, contact the IEEE-SA
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 - IEEE-SA Copyright Policy, see
Clause 7 of the *IEEE-SA Standards Board Bylaws*
<https://standards.ieee.org/about/policies/bylaws/sect6-7.html#7>
Clause 6.1 of the *IEEE-SA Standards Board Operations Manual*
<https://standards.ieee.org/about/policies/opman/sect6.html>
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- IEEE-SA Copyright FAQs
 - <http://standards.ieee.org/faqs/copyrights.html/>
- IEEE-SA Best Practices for IEEE Standards Development
 - http://standards.ieee.org/develop/policies/best_practices_for_ieee_standards_development_051215.pdf
- Distribution of Draft Standards (see 6.1.3 of the SASB Operations Manual)
 - <https://standards.ieee.org/about/policies/opman/sect6.html>

4. Review and approve minutes

Working Group Meeting #76, August 24

Update draft circulated August 24.

- No corrections advised prior to meeting

Attendees:

Ian McIntosh (Leonardo)
Terry Duepner (National Instruments)
Heiko Ehrenberg (GOEPEL Electronics)
Brian Erickson (JTAG Technologies)
Peter Horwood (Digital Development Consultants Ltd)
Bill Huynh (Marvell Inc.)
Richard Pistor (Curtiss-Wright)
Jan Schat (NXP Semiconductors)
Jon Stewart (Dell) (joined 11:08)
Louis Ungar (A.T.E. Solutions)
Brad Van Treuren (VT Enterprises Consulting Services)
Carl Walker (Cisco Systems)

5. Review open action items

Action Item Register:

<http://files.sjtag.org/PostStudyGroup/ActionItemRegister.xlsx>

Format of action number is

[Meeting#.Action# within that meeting]

[None]

6. Inter-group Collaboration

1149.4 and 1581 revision PARs out for sponsor approval.

7. Discussion Topics

7.a Discussion of perspectives on STAM

- See additional slides:
 - 16-20 from Ian McIntosh (viewed Aug 24)
 - 21-22 from Peter Horwood (viewed Aug 24)
 - 23 from Brad Van Treuren (unseen)
 - 26-30 from Brad Van Treuren (new this meeting)

7.b Diagrams and Terms

- Definitions from forum:
<http://forums.sjtag.org/viewforum.php?f=40>
- Reference Pack (previous material):
http://files.sjtag.org/P2654WG/P2654_Reference_Pack.pptx

Wrap-up items

8. Any other business
9. Today's Key Takeaways
10. Glossary terms from this meeting
11. Schedule next meeting
 - Sep 14
12. Topic for next meeting
 - Continue with discussion of Brad's slides
13. Reminders
14. List new action items
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Definitions

Device: Used in the sense of “something made or adapted for a particular purpose”, may be an individual component or a larger assembly (e.g. COTS board/module) – A lowest level “leaf” of the system, and end target instrument or collection of instruments

Component: An individual part, typically mounted on a PCB, that behaves other than transparently on the data passing through it
– Essentially a part that doesn’t meet the requirements of a “device” but has an effect on what’s needed to perform a test

P2654 “Actors”

End user*: Person (or sub-assembly) that wishes to execute a test

Test Developer*: Creator of tests for the End user and who may use test tools

Test Tool Vendor: Provider of software tools to aid test creation

System Integrator: Person that aggregates sub-assemblies (boards, devices) to form a system

Circuit Designer†: Person creating boards or sub-assemblies

Device Vendor†: Person designing/supplying a low-level part to be used by circuit designers

EDA Tool Vendor: Provider of software tools to aid circuit/device design

* Roles may be combined in “interactive” applications

† Possibly there is overlap between these?

PAR Scope and Purpose

Scope: This standard addresses use/ reuse of test assets in system context by:
1) defining a representation for behavioral descriptions of pertinent sub-assembly interfaces and of relevant data and protocol transformations; 2) defining methods for utilizing such representations to enhance management of and access to said test assets. In conjunction with existing methods for test access and test management, this will allow the coordination and control of a variety of digital interfaces to devices, boards, and sub-systems to extend test access to board and system levels. This standard does not replace or provide an alternative to existing test interface standards, but aims instead to enable their usage throughout the hierarchy of systems.

Purpose: The purpose of this standard is to facilitate a means to seamlessly integrate component access topologies, interface constraints, and other dependencies at the board and system level by using standardized descriptions focusing on topology, interfaces and behavior (as opposed to physical structure). This will ease the burden on those preparing test, maintenance and support applications, including Automatic Test Pattern Generation (ATPG), in particular where the application requires to co-ordinate control of and data transfer through multiple interfaces and/or protocols. Typically, the providers of these conforming descriptions are the producers of integrated circuits, printed circuit boards or sub-systems, including, for example, intellectual property cores in a System on Chip (SoC), with digital interfaces that are intended to be used in an automated fashion within a larger assembly. This standard will also include a methodology to ensure access to particular destination registers in the correct time order.

P2654 in a nutshell

In essence, it is the “glue” that binds the test instruments to the testable system’ interface boundary

It doesn’t define the test instruments or how they behave

It doesn’t define the test application

It doesn’t (explicitly) define a UI at the system boundary – that’s derived from the behaviours of the constituent parts and the available external interfaces

For each actor...

To what extent do they need to **be aware** of P2654?

What will they **get out** of P2654?

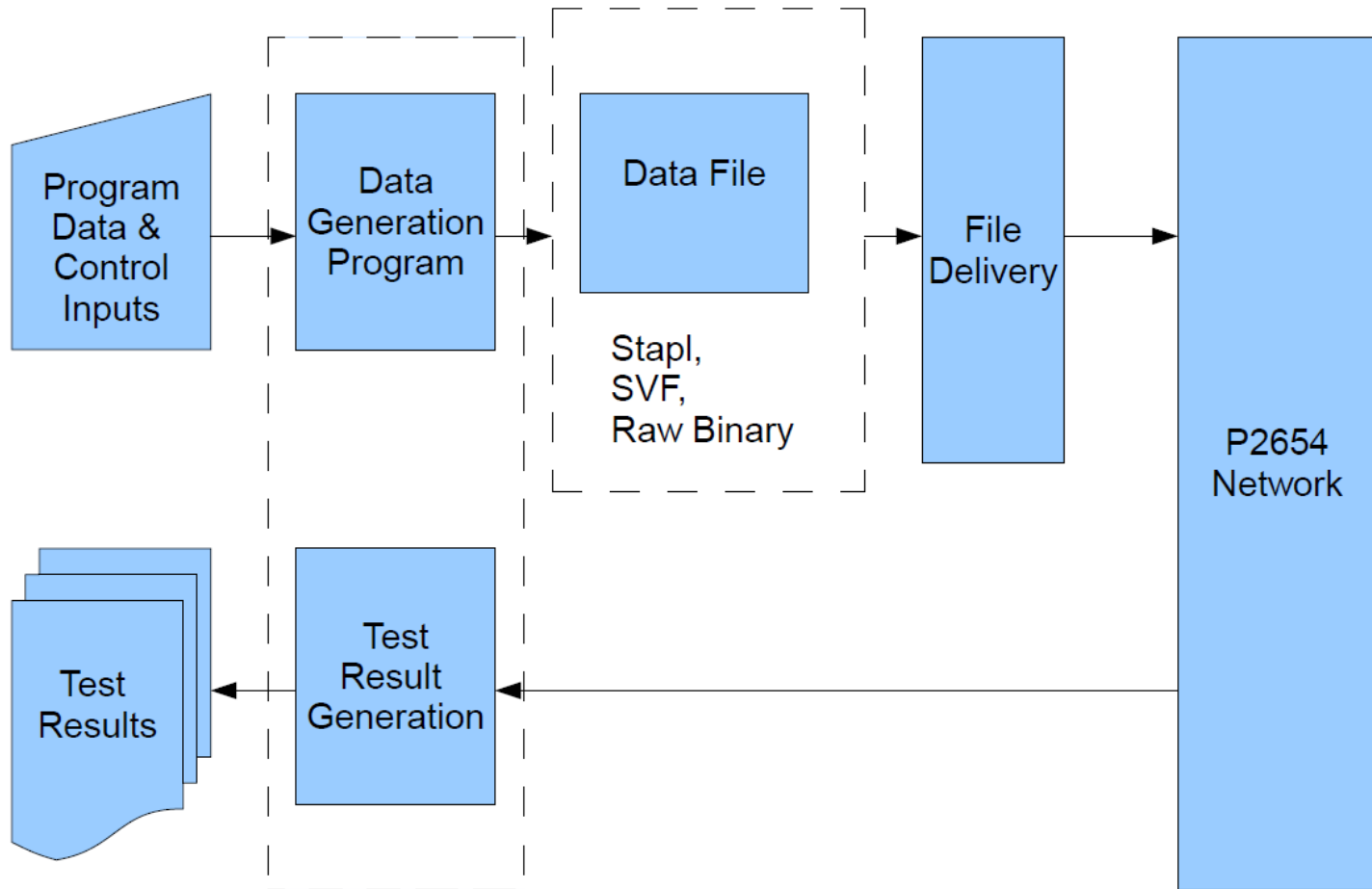
What (if anything) do they need to **create** for P2654 to work?

What (if anything) do they need to **know** (from other actors) in order to use P2654?

What (if anything) do they **already know** that applies to P2654 needs?

How will they **use** P2654?

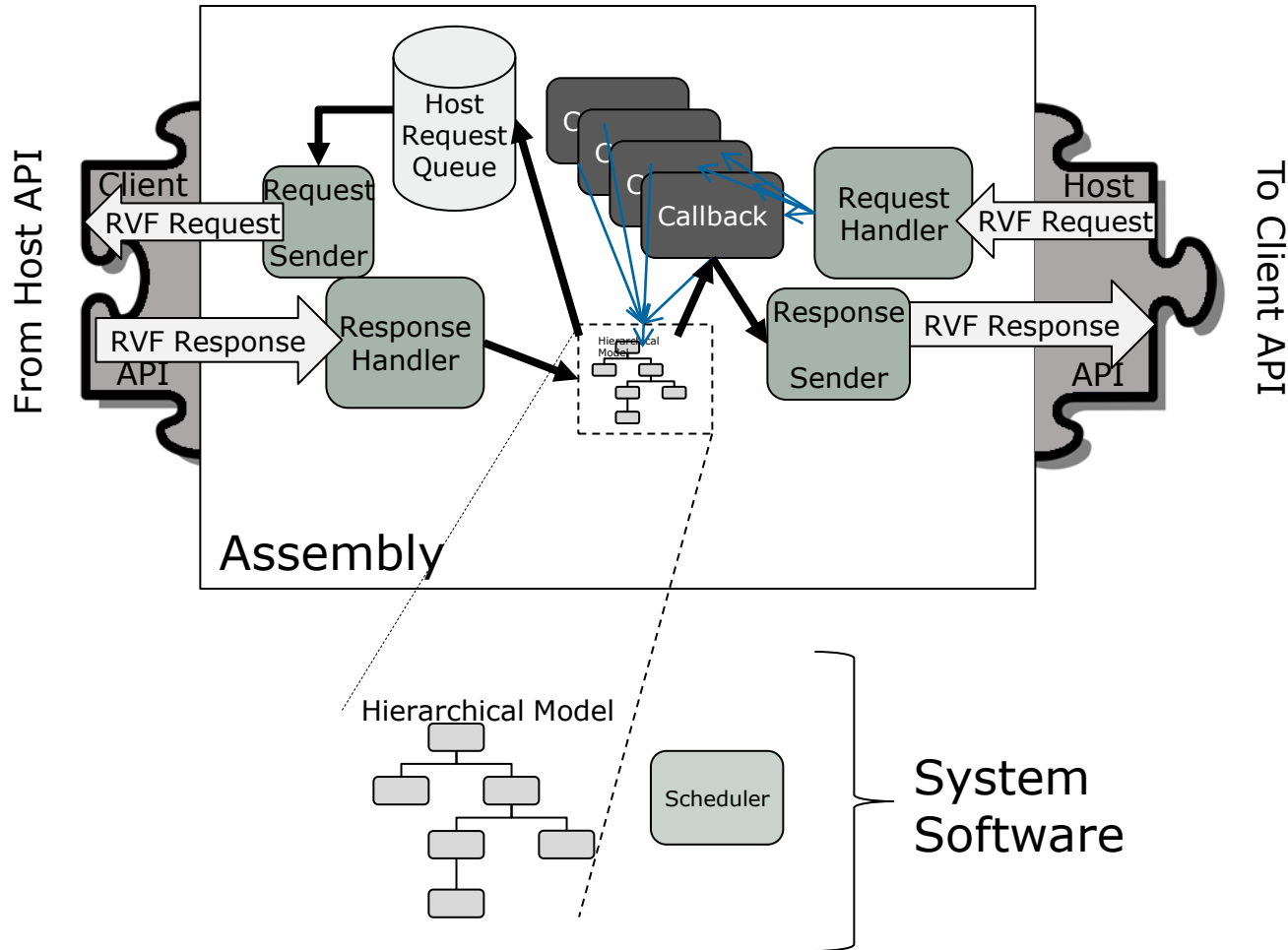
Vector Generation Interactions



Untitled (2)

- Input to test delivery generation can be TCL, or vendor specific
- Dependent on the tool flow the generation and delivery may be in a single operation or split in to separate actions

Architecture1



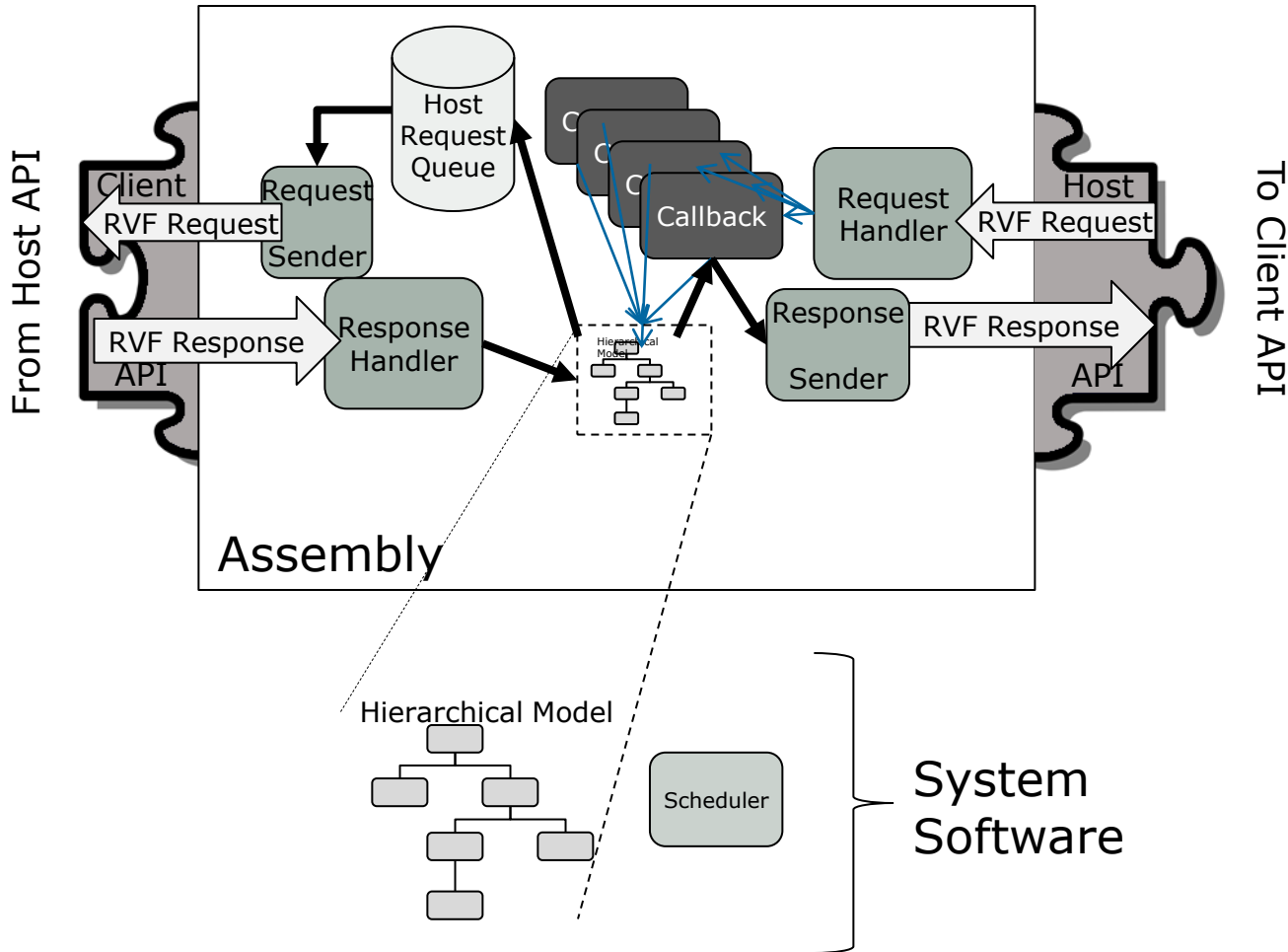
Discussion 20200824

- Product Data Management System (Leonardo)
 - Parts: Something that you make
 - Component: Something that you buy
- Additional Actors
 - Device IP Integrator
 - Device Designer
- Actors have different perspectives of P2654
- An Actor may never see to concept of P2654 when applying tests
- P2654 is the glue between the top and bottom ends of a design
- See P2654 in a nutshell slide from meeting pack
- P2654 is not defining an interface, but querying for capability may require a software interface definition (define method or just principle)

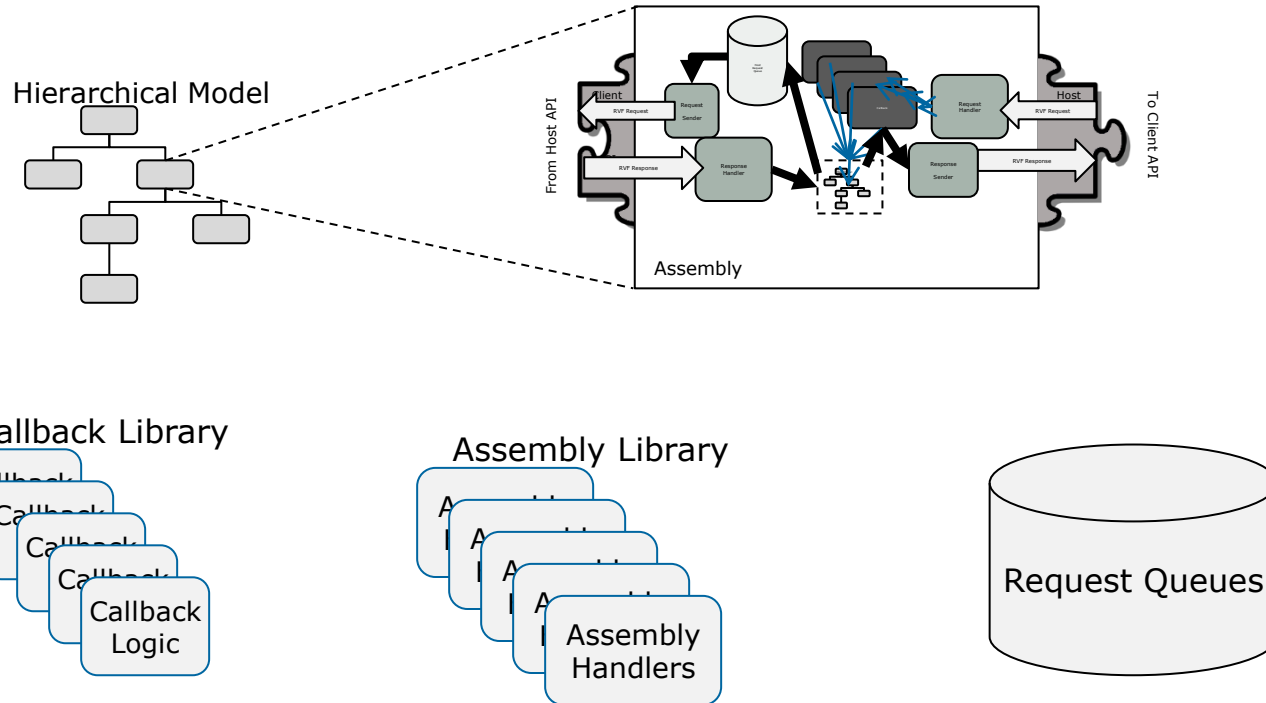
Discussion 20200824

- Data File in diagram is really Data Stream
- File delivery is really the Data Stream to driver for P2654 Network interface provided by integrator/tool vendor
- P2654 really resided in the Data Generation Program and Test Result Generation boxes. The other boxes are outside the scope of P2654
- P2654 is concerned with the data stream interacting with the network driver interface. System or tool designer is responsible for integrating the data stream with the hardware interface.

Architecture1



Context1



Modeling Issues

- PDL references entities using hierarchical path names based on context of the ICL module addressed (iWrite mbist.r1 0x23)
- This path is a relative path for the context of device, board, and system as the PDL is intended to be reused for all instances of that ICL module in the design
- Thus, the absolute path to the target instance, giving the application proper context to which instance to reference, is required to resolve the overall context at run-time by the application or data generator
- This is subtly different than resolving the context by the retargeter or transformation callback
- Transformation logic is a reusable callback for all instances of the target entity
- Transformation logic needs to be able to resolve context itself separate from the application context based on the target instance being used

Modeling Issues

- How do we indicate what model elements are necessary for transformation logic as parameters/attributes(e.g., address filtered out of data or indirectly as set by writing a Register as separate scan operation?)?
- When activating a path to a leaf register, do you:
 - Automatically cascade up a branch sequentially activating each branch level from top down towards the target register?
 - Or, do you require manual specification by the user to the model within the application code?
 - (1687 Retargeter automatically enables SIBs on a 1687 Network)
- How do you model dependencies between model elements, like registers? (e.g., Selection of active TAP TDR is dependent on the value of the TAP IR. Writing to TAP IR or TAP DR is dependent on the TAP state.)
Dependencies:
 - Associated Register(s)
 - Associated state
 - Associated signal value

ICL Describes Structural Primitives

- IEEE 1687 Structural Primitives
 - DataInput Register
 - DataOutput Register
 - ScanRegister
 - ScanMUX
 - Associated Control Signal(s)
 - Associated Selection Register
 - Binary
 - OneHot
 - OneHot –No IDLE
 - ZeroHot
 - ZeroHot – no IDLE
 - DataMUX (Same control associations)