

# Stateye for SATA/SAS

An overview of Stateye v5



Never stop thinking

# Versions

- v1 & v2
  - original Matlab scripts used for channel analysis in OIF originally supported by Anthony, now completely obsolete
- v3
  - 1st widely available version additionally supported by Acurid from the [www.stateye.org](http://www.stateye.org) website
  - unfortunately, Acurid is now bankrupt and this version has become effectively obsolete
- v4
  - commercially supported development by OIF in accordance with CEI Standard
  - supported by Edotronik at [www.edotronik.de/stateye](http://www.edotronik.de/stateye)
- v5
  - coming soon...
  - commercial sponsorship for Edotronik under discussion
  - [www.stateye.org](http://www.stateye.org) will be re-vamped to support further open source development

## v4 Feature Set

- Matlab based
- S-parameter manipulation and cascading
- LTE Support (adaptive)
- DFE Support (adaptive)
- FIR Support (adaptive)
- CDR (Edge or amplitude based)
- XML Based batch language
- GUI Object editor
- UNIX, Linux, Windows support for engine

```
C:\UserData\stateye\Tyco.xml - Qimonda
File Edit View Favorites Tools Help
Back Forward Stop Home Search Favorites Media
Address C:\UserData\stateye\Tyco.xml Go Links
+ <channel comment="" id="F50_case1">
+ <channel comment="" id="F50_case1_noxt">
+ <channel comment="" id="F50_case1_noxt_opt">
+ <channel comment="" id="F50_case1_opt">
- <channel comment="" id="F50_case2">
  <characteristic chartype="fwd" description="smatrix" filename="" reference="F50_case2_1" weight="1" noports="8" txp="" txn="" rxp="5"
  rxn="6" txp_fwd="1" txn_fwd="2" rxp_fwd="5" rxn_fwd="6" txp_xt="3" txn_xt="4" rxp_xt="5" rxn_xt="6" />
  <characteristic chartype="xt" description="smatrix" filename="" reference="F50_case2_1" weight="1" noports="8" txp="" txn="" rxp="5" rxn="6"
  txp_fwd="1" txn_fwd="2" rxp_fwd="5" rxn_fwd="6" txp_xt="3" txn_xt="4" rxp_xt="5" rxn_xt="6" />
  <characteristic chartype="xt" description="smatrix" filename="" reference="F50_case2_2" weight="1" noports="8" txp="" txn="" rxp="5" rxn="6"
  txp_fwd="1" txn_fwd="2" rxp_fwd="5" rxn_fwd="6" txp_xt="3" txn_xt="4" rxp_xt="5" rxn_xt="6" />
  <characteristic chartype="xt" description="smatrix" filename="" reference="F50_case2_3" weight="1" noports="8" txp="" txn="" rxp="5" rxn="6"
  txp_fwd="1" txn_fwd="2" rxp_fwd="5" rxn_fwd="6" txp_xt="3" txn_xt="4" rxp_xt="5" rxn_xt="6" />
</channel>
+ <channel comment="" id="F50_case2_noxt">
+ <channel comment="" id="F50_case3">
+ <channel comment="" id="F50_case3_noxt">
+ <channel comment="" id="F50_case4">
+ <channel comment="" id="F50_case4_noxt">
+ <channel comment="" id="F50_case5">
+ <channel comment="" id="F50_case5_noxt">
+ <channel comment="" id="F50_case6">
+ <channel comment="" id="F50_case6_noxt">
+ <channel comment="" id="F50_case7">
+ <channel comment="" id="F50_case7_noxt">
</channellist>
+ <receiverlist>
+ <jitterlist>
</definitions>
- <analysis>
+ <run comment="" id="Tyco_01" inactive="False" runtime="simple" jitter="gaussjit" width="30" baudrate="3e9;6.375e9;11.1e9" precursors="4"
postcursors="50" bins="2000" fmax="3*baudrate" fmin="50e6" fstep="50e6">
+ <run comment="" id="Tyco_01x" inactive="False" runtime="simple" jitter="gaussjit" width="30" baudrate="3e9;6.375e9;11.1e9" precursors="4"
postcursors="50" bins="2000" fmax="3*baudrate" fmin="50e6" fstep="50e6">
+ <run comment="" id="Tyco_02" inactive="False" runtime="simple" jitter="gaussjit" width="30" baudrate="3e9;6.375e9;11.1e9" precursors="4"
postcursors="50" bins="2000" fmax="3*baudrate" fmin="50e6" fstep="50e6">
+ <run comment="" id="Tyco_02x" inactive="False" runtime="simple" jitter="gaussjit" width="30" baudrate="3e9;6.375e9;11.1e9" precursors="4"
postcursors="50" bins="2000" fmax="3*baudrate" fmin="50e6" fstep="50e6">
+ <run comment="" id="Tyco_03" inactive="False" runtime="simple" jitter="gaussjit" width="30" baudrate="3e9;6.375e9;11.1e9" precursors="4"
postcursors="50" bins="2000" fmax="3*baudrate" fmin="50e6" fstep="50e6">
- <run comment="" id="Tyco_03x" inactive="False" runtime="simple" jitter="gaussjit" width="30" baudrate="3e9;6.375e9;11.1e9" precursors="4"
postcursors="50" bins="2000" fmax="3*baudrate" fmin="50e6" fstep="50e6">
  <composition transmitter="transmitterOptPre"
  channel="F50_case1_noxt;F50_case2_noxt;F50_case3_noxt;F50_case4_noxt;F50_case5_noxt;F50_case6_noxt;F50_case7_noxt"
  receiver="receiver0tap" />
</run>
+ <run comment="" id="Tyco_05" inactive="False" runtime="simple" jitter="gaussjit" width="30" baudrate="3e9;6.375e9;11.1e9" precursors="4"
postcursors="50" bins="2000" fmax="3*baudrate" fmin="50e6" fstep="50e6">
```

# Object Editor



Stateye-GUI V.4.2.2 - C:\UserData\stateye\Tyco.xml

File Edit View Tools Help

[11] Elaboration [12] Message log

[1] Settings & options [2] Transmitter objects [2] Smatrix objects [4] Channel objects [5] Receiver objects [6] Jitter objects [7] Analysis runs [8] Tree view [9] Run generator [10] CBF:XML view

Select items in the list to view/edit their properties:

<input checked="" type="checkbox"/>	<input type="checkbox"/>	Tyco_01
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Tyco_01x
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Tyco_02
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Tyco_02x
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Tyco_03
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Tyco_03x
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Tyco_05
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Tyco_05x
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Tyco_07
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Tyco_07x
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Tyco_08
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Tyco_08x
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Tyco_09
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Tyco_09x

<b>Analysis timing parameters</b>	
baudrate *	3e9;6.375e9;11.1e9
jitter	gaussjit
<b>Basics</b>	
deactivated run	False
unique identifier *	Tyco_03x
<b>Composition elements</b>	
transmitter *	transmitterOptPre
channel *	F50_case1_noxt;F50_case2_noxt;F50_case3_noxt;F50_ca
receiver *	receiver0tap
<b>Cursors</b>	
postcursors *	50
precursors *	4
<b>Misc</b>	
comment	
<b>Stateye analysis parameters</b>	
bins *	2000
width *	30

**transmitter \***  
XML attribute 'transmitter':  
Reference to existing transmitter object (transmitter id), describing transmitter equalization

Ready

# Object Editor



Stateye-GUI V.4.2.2 - C:\UserData\stateye\Tyco.xml

File Edit View Tools Help

[11] Elaboration [12] Message log

[1] Settings & options [2] Transmitter objects [2] Smatrix objects [4] Channel objects [5] Receiver objects [6] Jitter objects [7] Analysis runs [8] Tree view [9] Run generator [10] CBF-XML view

Select items in the list to view/edit their properties:

- Ch F50\_case1
- Ch F50\_case1\_nox
- Ch F50\_case1\_noxt\_opt
- Ch F50\_case1\_opt
- Ch F50\_case2
- Ch F50\_case2\_nox
- Ch F50\_case3
- Ch F50\_case3\_nox
- Ch F50\_case4
- Ch F50\_case4\_nox
- Ch F50\_case5
- Ch F50\_case5\_nox
- Ch F50\_case6
- Ch F50\_case6\_nox
- Ch F50\_case7
- Ch F50\_case7\_nox

<b>Basics</b>	
unique identifier *	F50_case2
<b>Misc</b>	
comment	
<b>Smatrix input data</b>	
characteristic components	<b>[characteristic collection]</b>
[00] synopsis ->	<b>type=fwd reference=F50_case2_1</b>
chartype *	<b>fwd</b>
description *	<b>smatrix</b>
filename *	
reference *	<b>F50_case2_1</b>
[01] synopsis ->	<b>type=xt reference=F50_case2_1</b>
chartype *	<b>xt</b>
description *	<b>smatrix</b>
filename *	
reference *	<b>F50_case2_1</b>
[02] synopsis ->	<b>type=xt reference=F50_case2_2</b>
chartype *	<b>xt</b>
description *	<b>smatrix</b>
filename *	
reference *	<b>F50_case2_2</b>
[03] synopsis ->	<b>type=xt reference=F50_case2_3</b>

**reference \***  
XML attribute 'reference':  
Reference to an existing smatrix object, required if description=smatrix, otherwise ignored

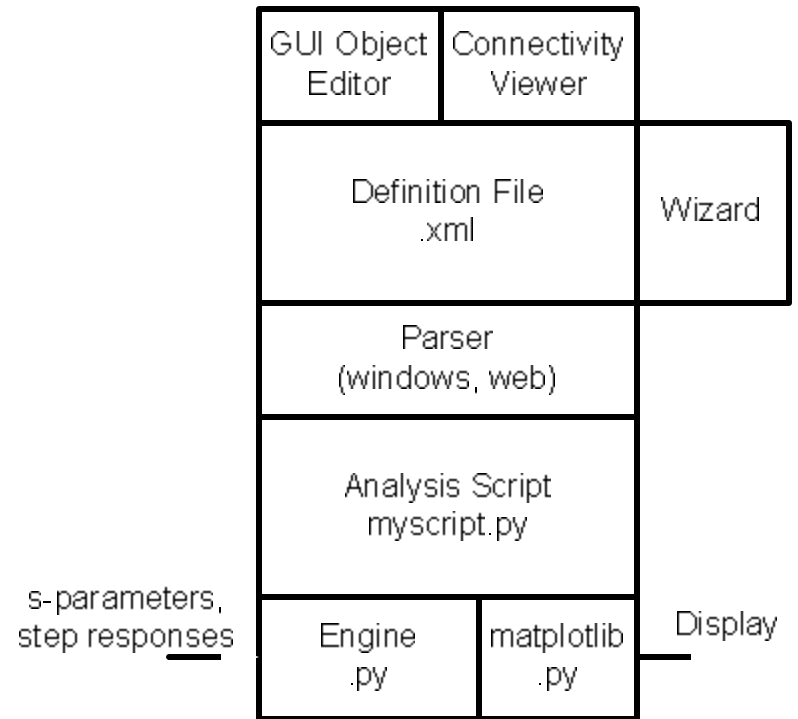
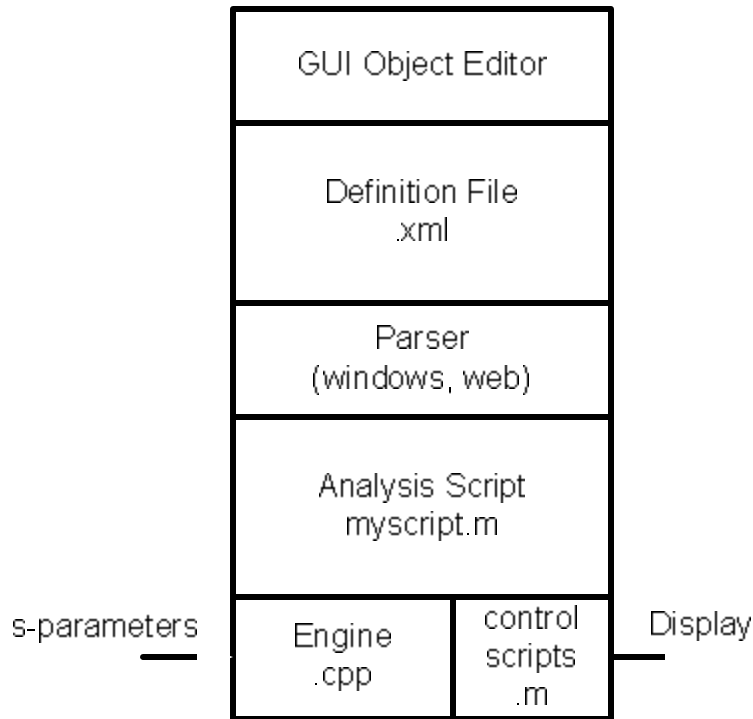
Information: Object references successfully updated

## v5 Feature Set

As per v4 but..

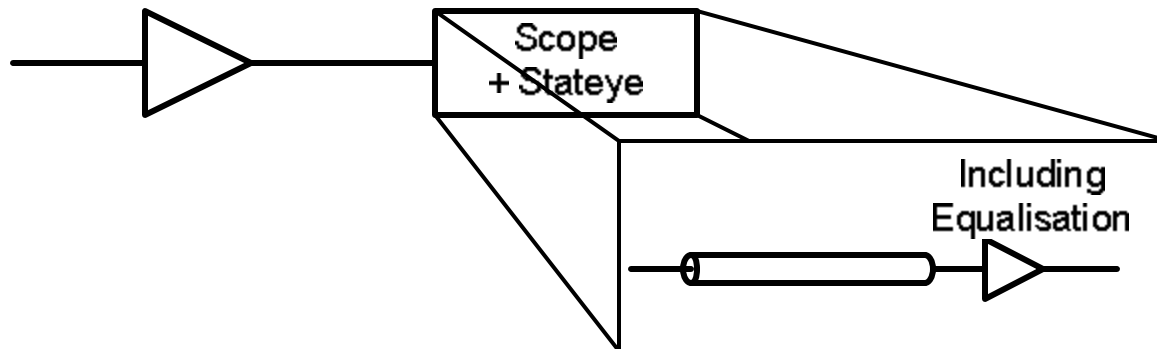
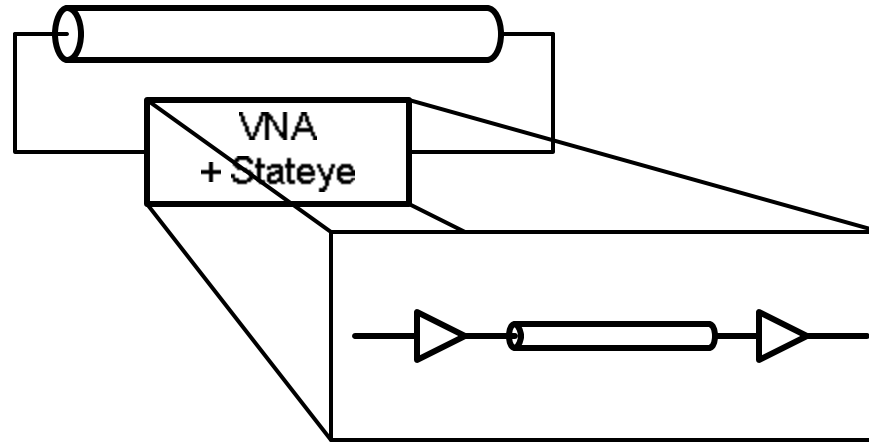
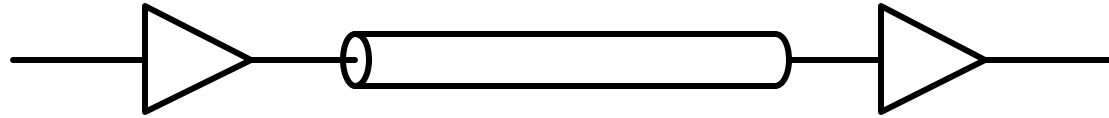
- Python based
- Measurement scope interface
- PWS Support
- 8b10b
- Wizard
- Connectivity Editor

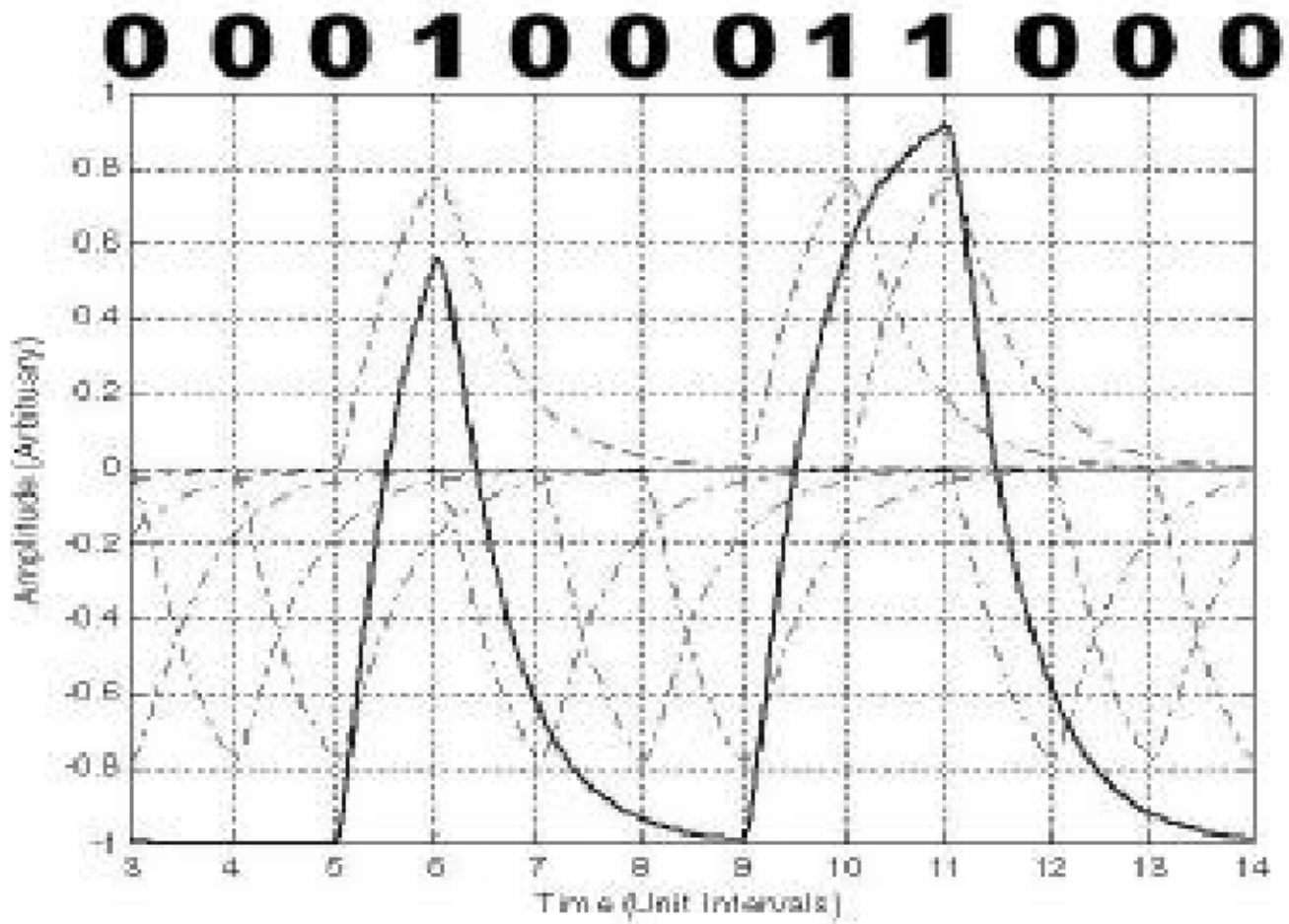
# Software Stack





# v5 Use Models





**Figure 5 - Intersymbol Interference (ISI)**

# Pulse Response Explanation

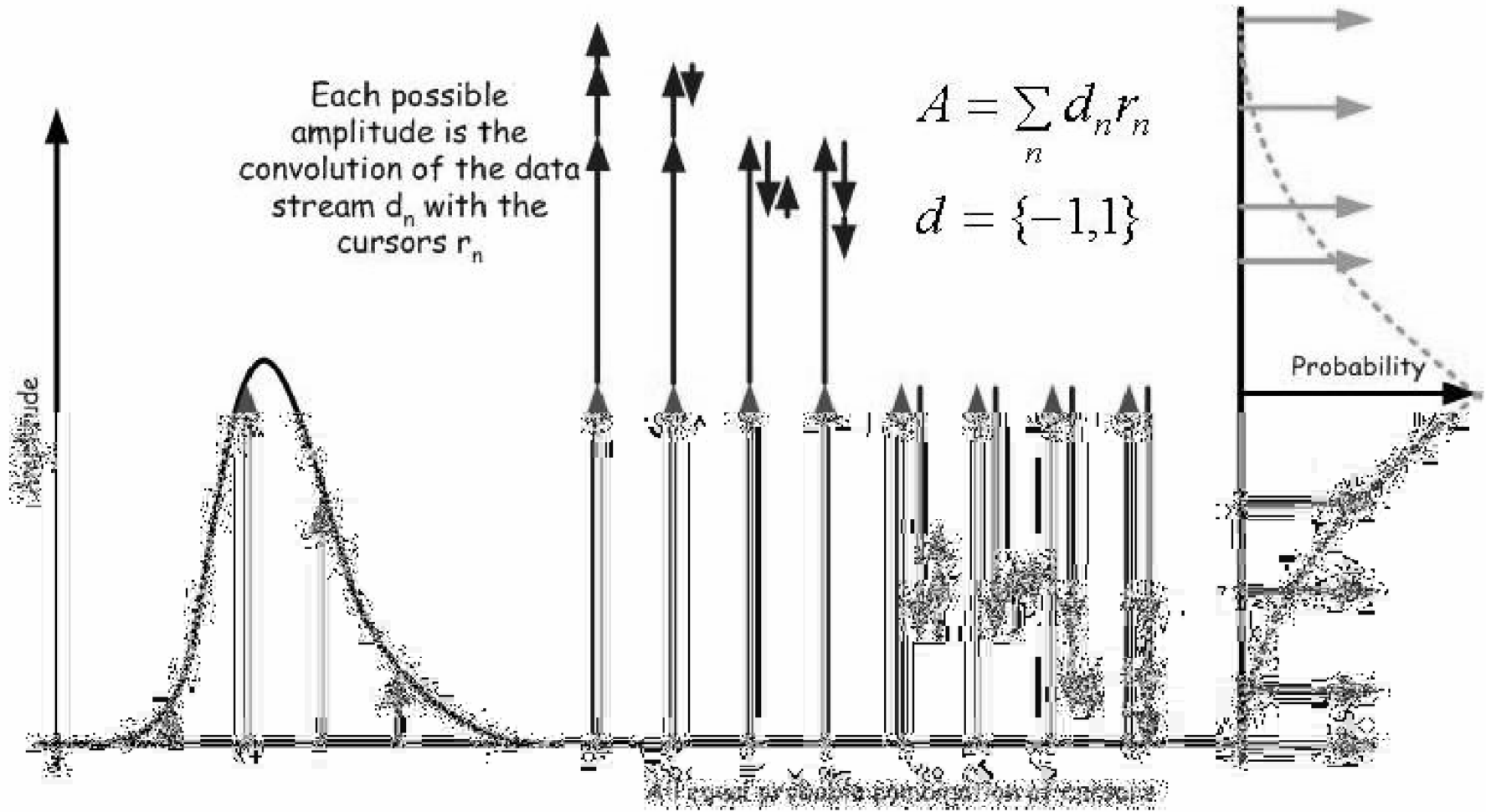
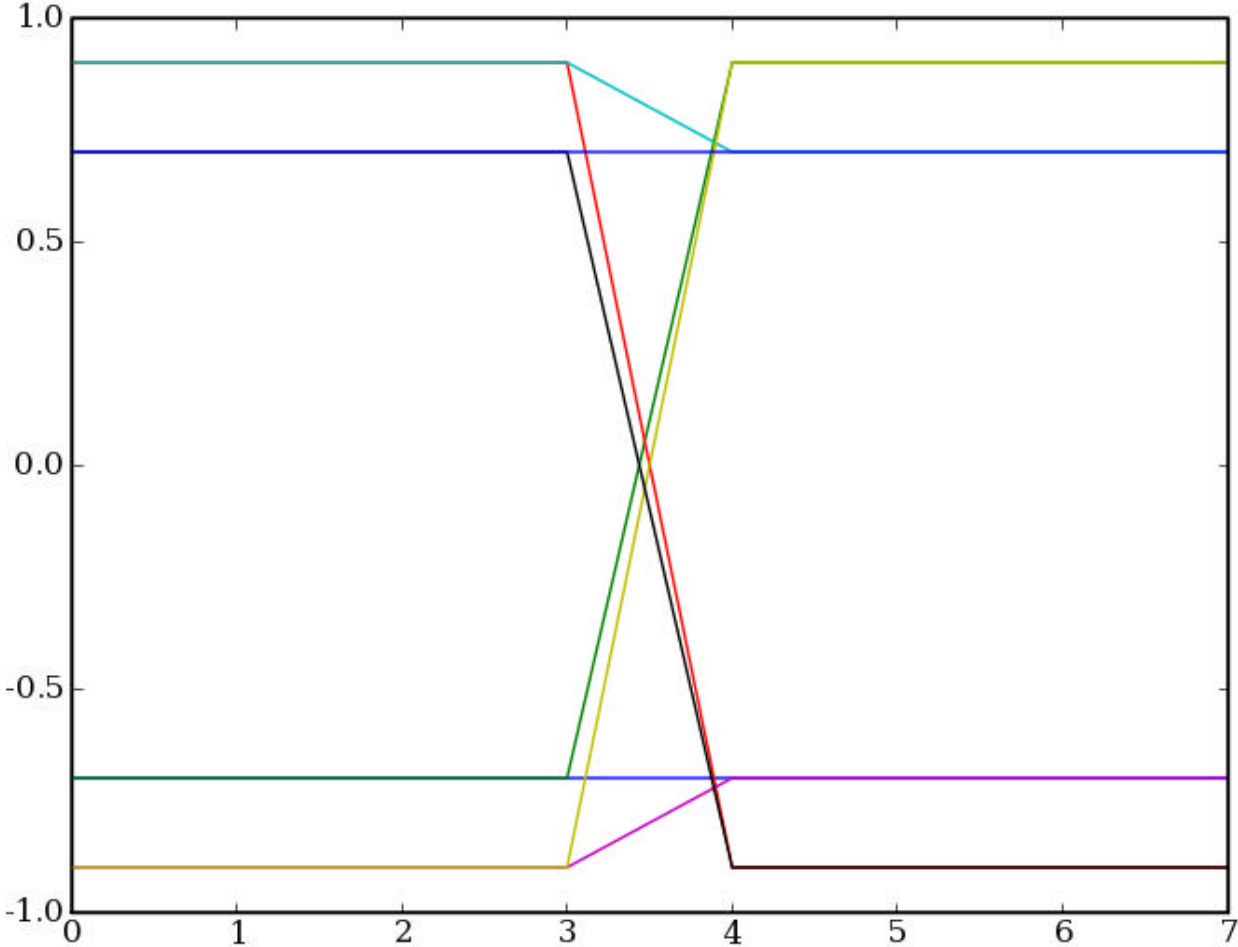
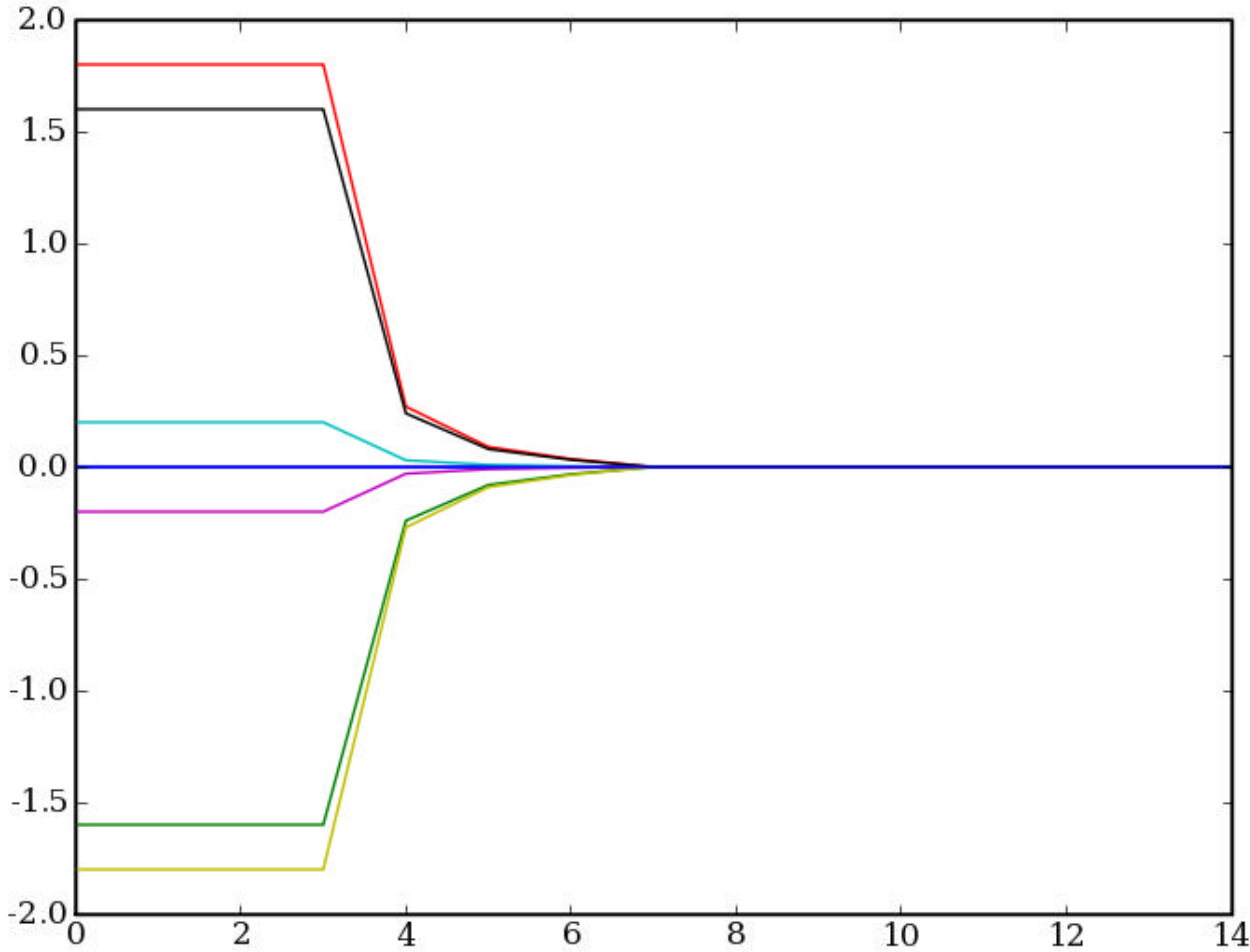


Figure 12 - ISI PDF

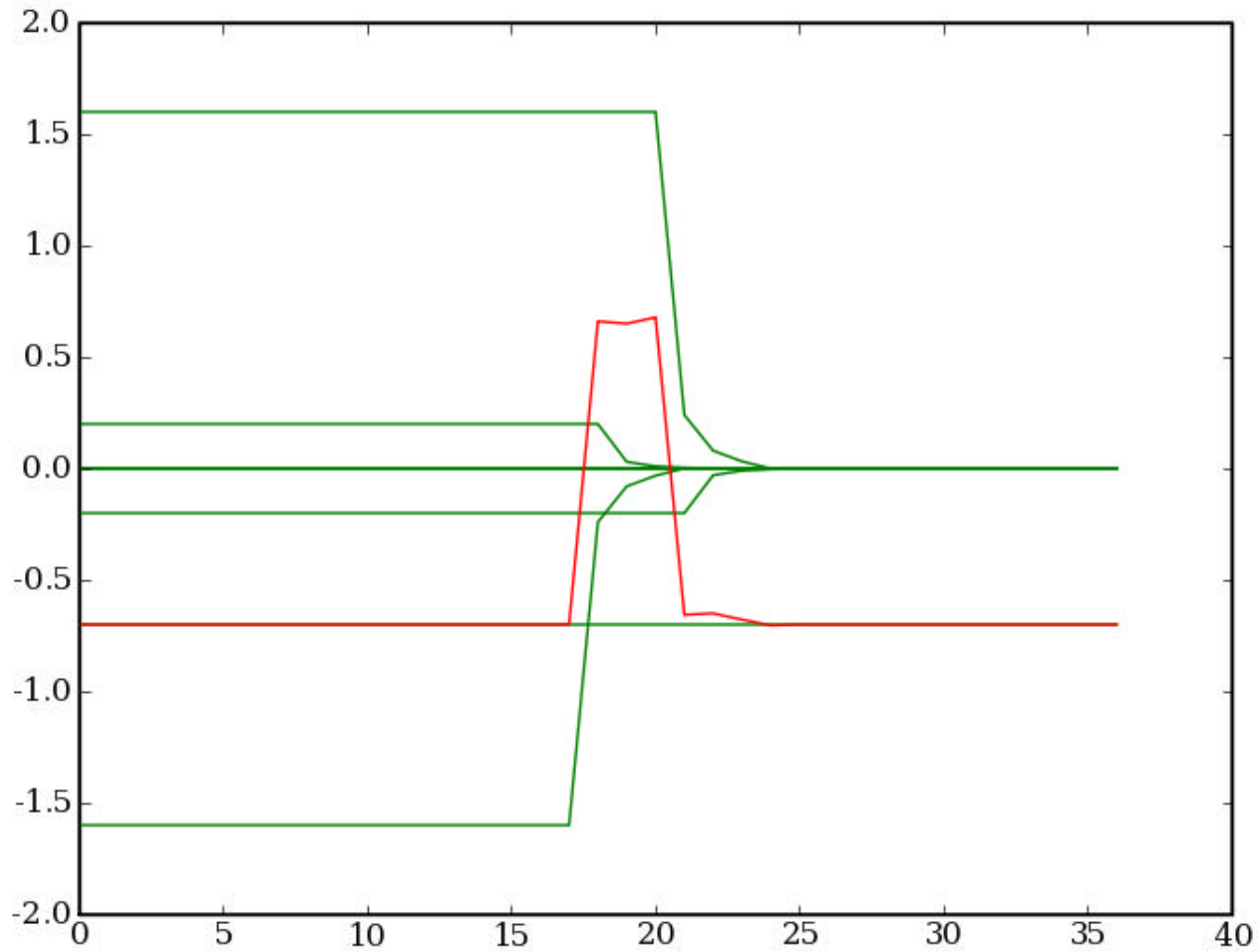
# Transitions



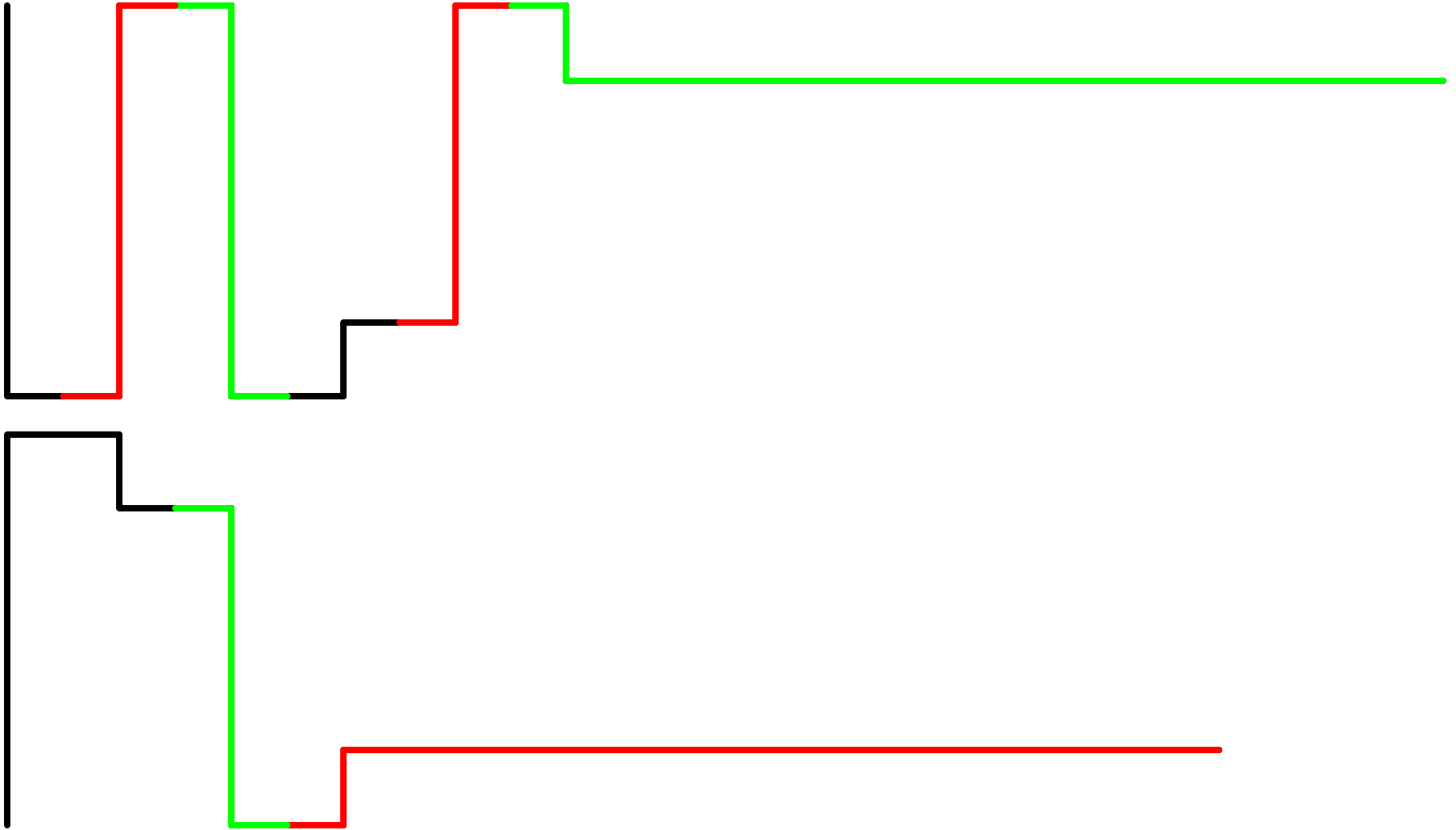
# Step Responses

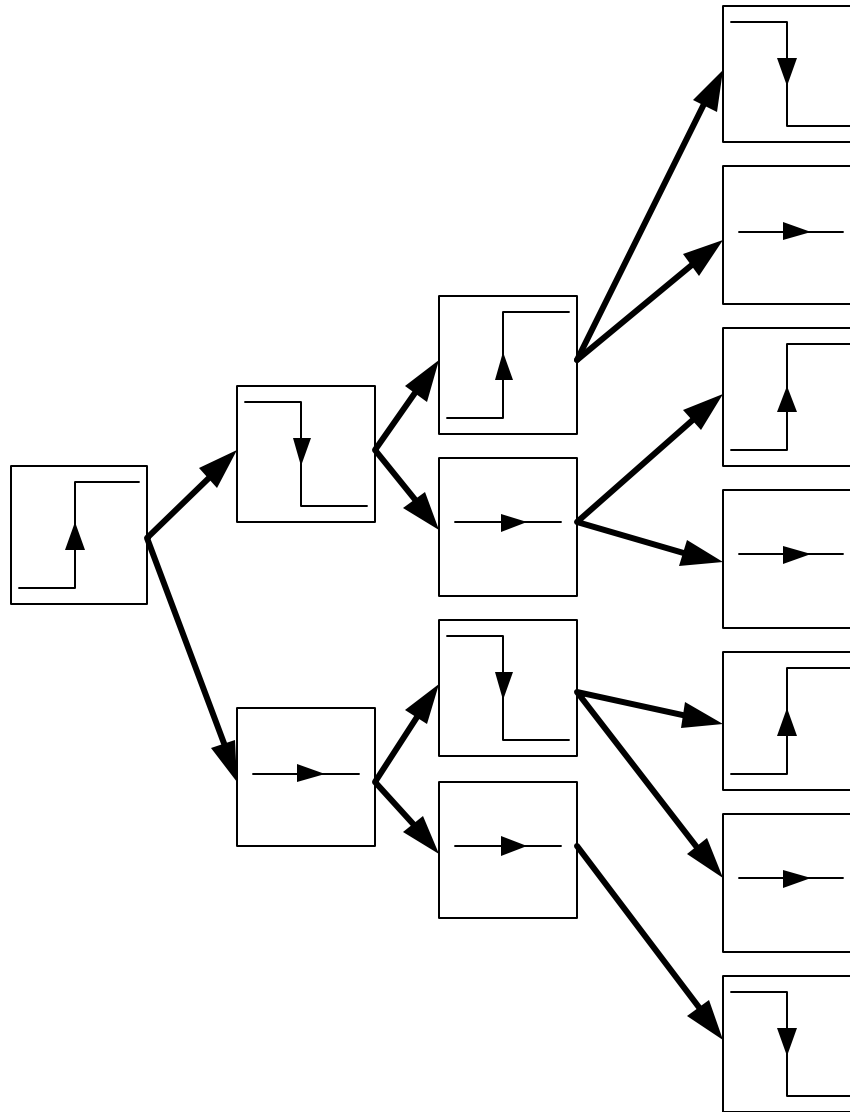


# Superposition / PWS



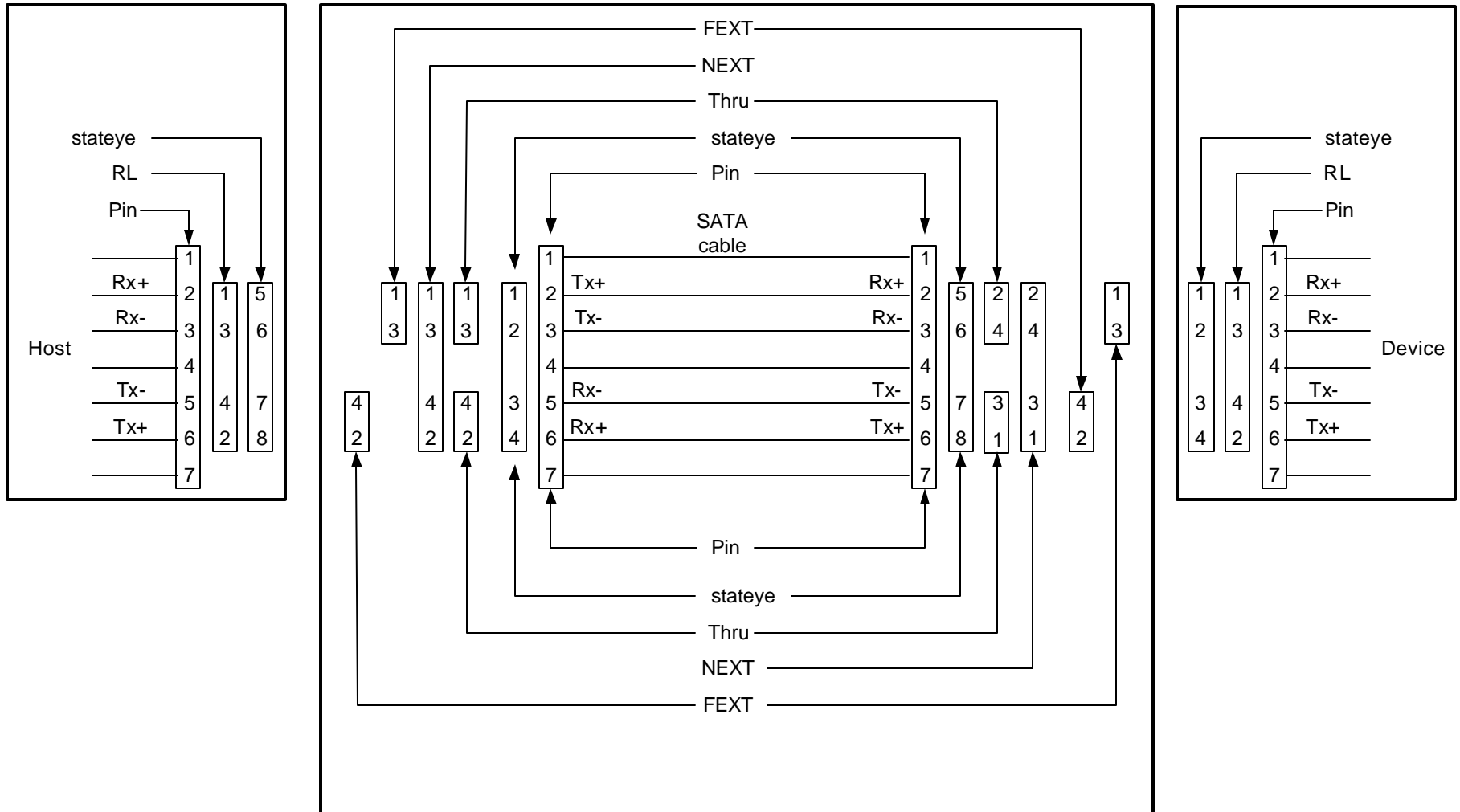
# Edge Extraction using Scope







# SATA Channel Demonstration



# SATA Demonstration Connectivity



Stateye-GUI V.4.2.2 - E:\temp\exampleSN13.xml \*

File Edit View Tools Help

[11] Elaboration [12] Message log

[1] Settings & options [2] Transmitter objects [2] Smatrix objects [4] Channel objects [5] Receiver objects [6] Jitter objects [7] Analysis runs [8] Tree view [9] Run generator [10] CBF/XML view

Select items in the list to view/edit their properties:

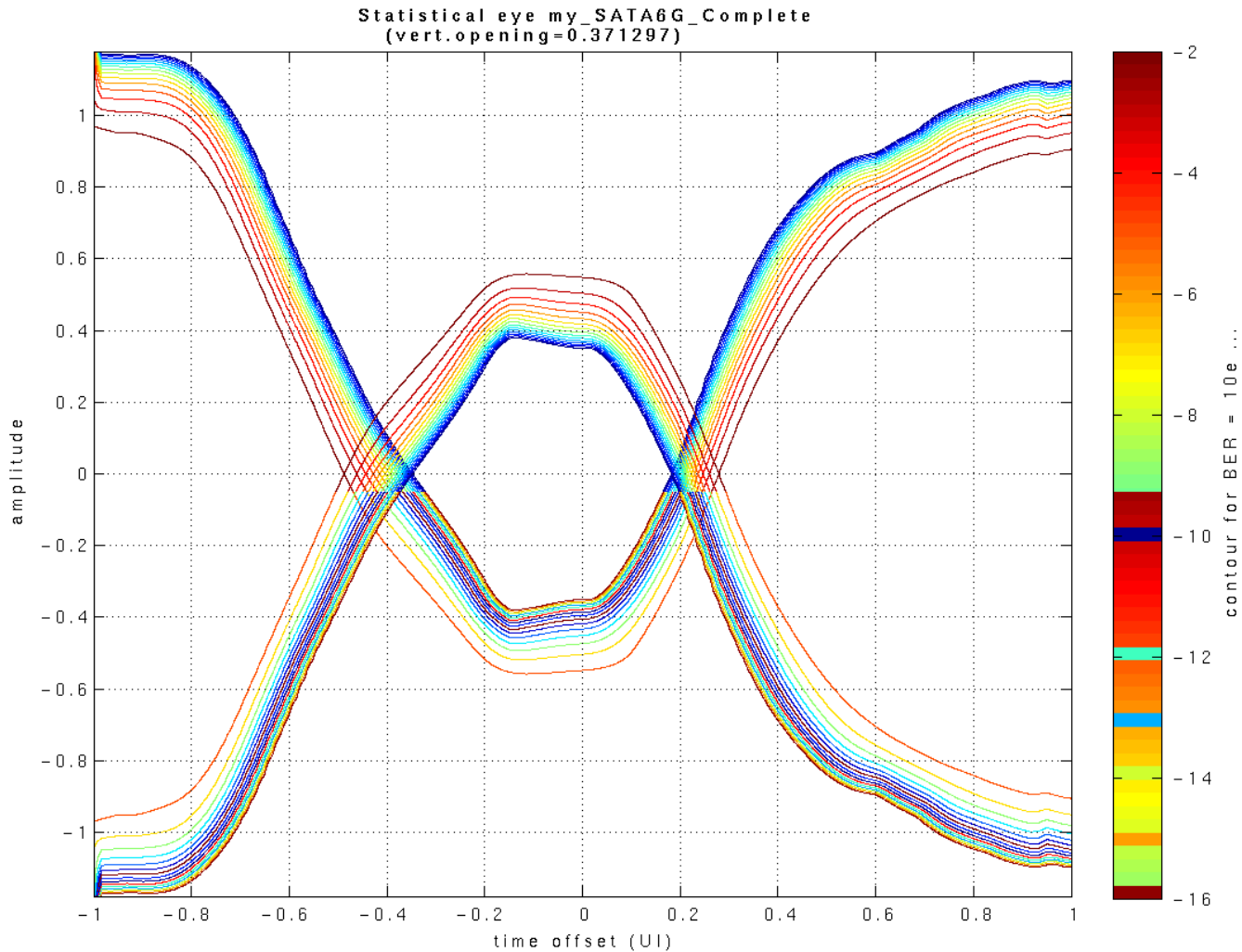
- S4 device
- S4 host
- S<sub>c</sub> link
- S<sub>f</sub> myRx
- S<sub>f</sub> myTx
- S4 SATA1mSN13

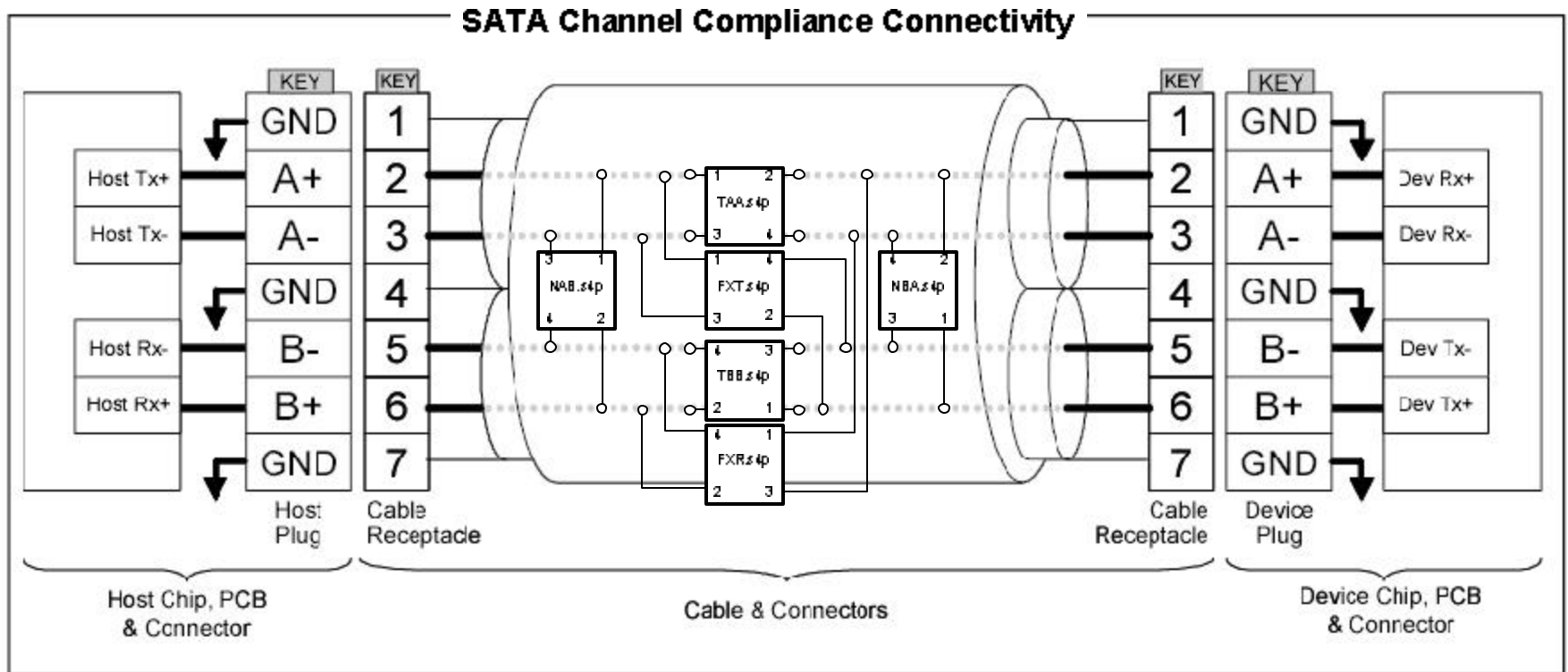
<b>Basics</b>	
description *	s8x8
unique identifier *	SATA1mSN13
<b>Deprecated</b>	
smatrix as reference frequency	
<b>Misc</b>	
comment	
DC algorithm	
<b>Smatrix component format</b>	
component format *	s4x4
<b>Smatrix input data</b>	
<b>s4x4 components</b>	
<b>[00] synopsis -&gt;</b>	
filename *	filename=Thru1m13.s4p
p *	Thru1m13.s4p
	1 5 2 6
<b>[01] synopsis -&gt;</b>	
filename *	filename=Thru1m13.s4p
p *	Thru1m13.s4p
	8 4 7 3
<b>[02] synopsis -&gt;</b>	
filename *	filename=FEXT1m13.s4p
p *	FEXT1m13.s4p
	1 8 2 7
<b>[03] synopsis -&gt;</b>	
filename *	filename=FEXT1m13.s4p
p *	FEXT1m13.s4p
	4 5 3 6
<b>[04] synopsis -&gt;</b>	
filename *	filename=NEXT1m13.s4p
p *	NEXT1m13.s4p
	1 4 2 3
<b>[05] synopsis -&gt;</b>	
filename *	filename=NEXT1m13.s4p
p *	NEXT1m13.s4p
	5 8 6 7

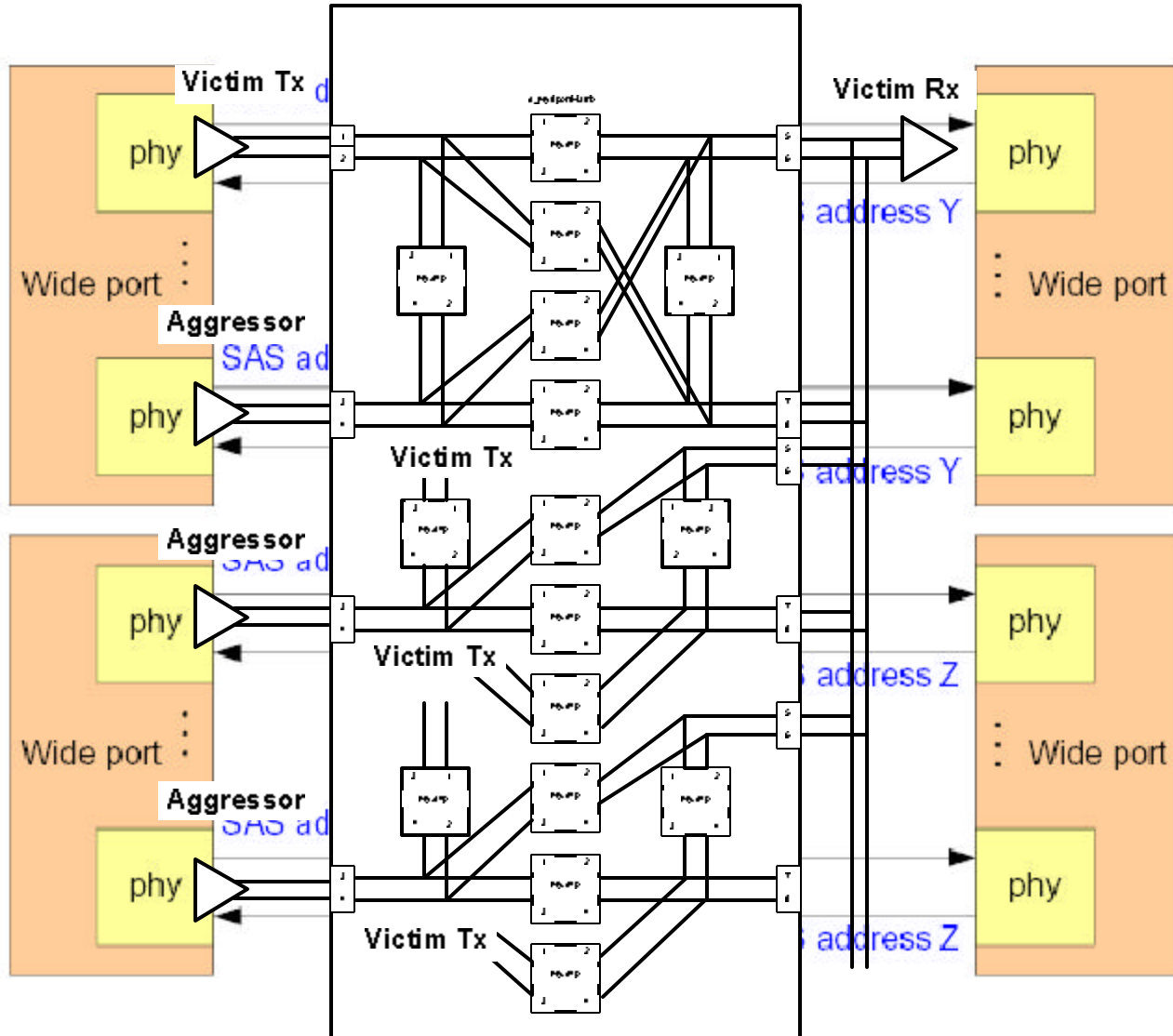
**[05] synopsis ->**  
 Subnode of type s4x4PropertyTable; see a synopsis of the object in the right column (not editable); to completely view and/or edit the object's parameters, expand the object by clicking the [+] button or use the collection editor by clicking the [...] button

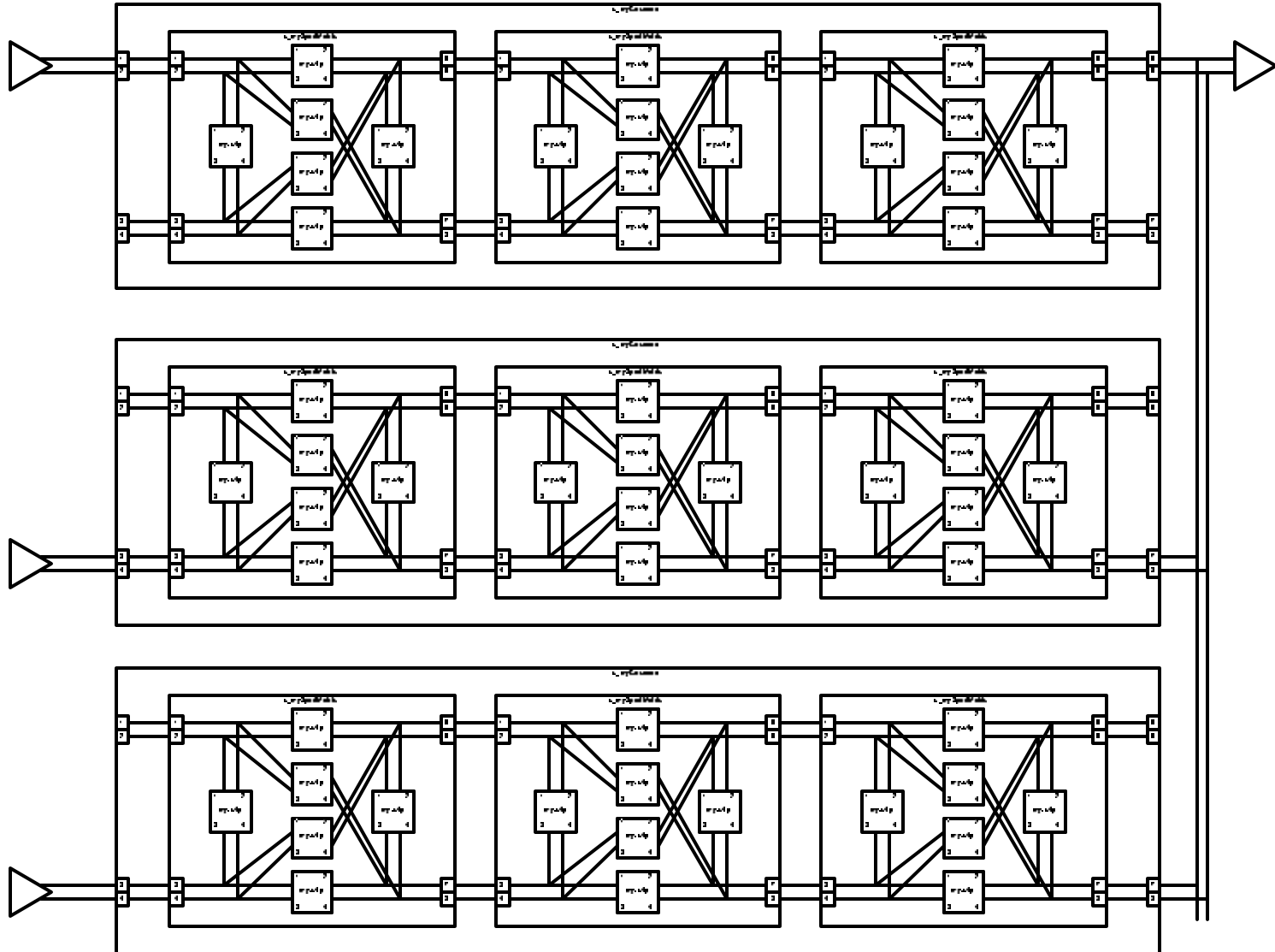
Ready

# Preliminary Results









## v5 Sponsorship

- Stateye
  - is an open source tool
  - is also a freely available tool
  - core development is done through voluntarily open source development
  - tool development and test is commercially supported through direct sponsorship
    - currently Infineon plus three instrumentation companies are considering the further support of the Stateye tool

# Timeline

- v4.2.2 final acceptance by EApr'07
- v5 Sponsorship closure EMay'07
- v5 alpha testing June/July'07
- v5.0 release EAug'07