Experiment Support in TIED Today and Tomorrow

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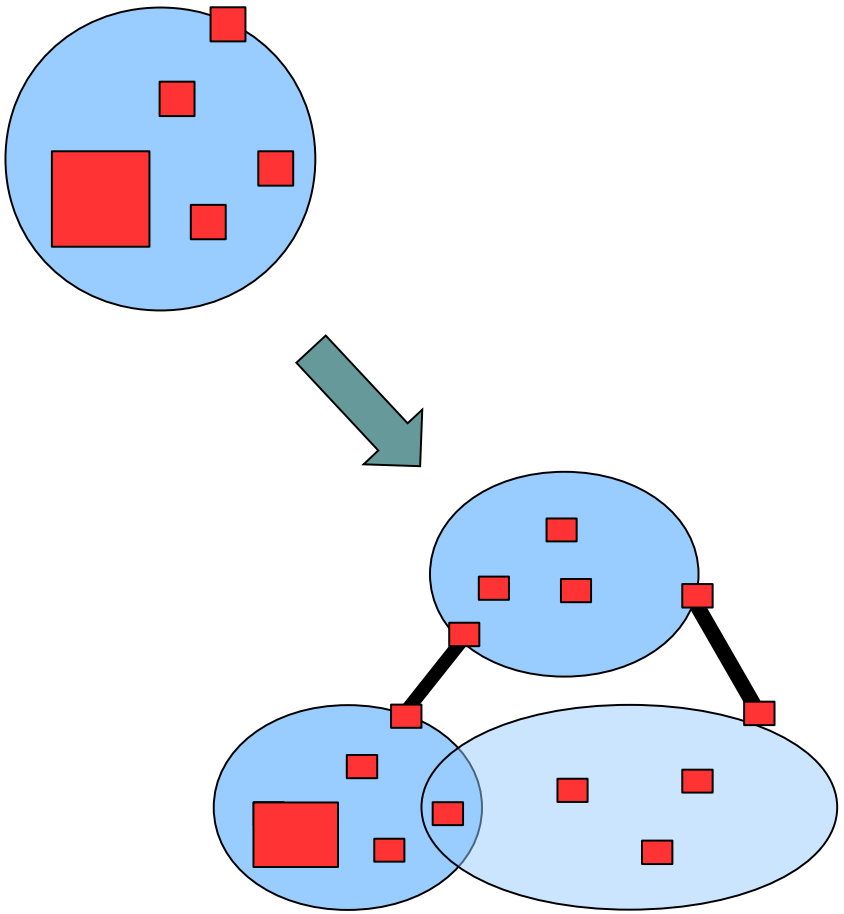
Talk Outline

- Experiment Description Today: CEDL
- Experiment Automation Tools: SEER
- Experiment Description and Validation Tomorrow
  - Validating invariants and environment
  - Understanding and constraining risky behavior

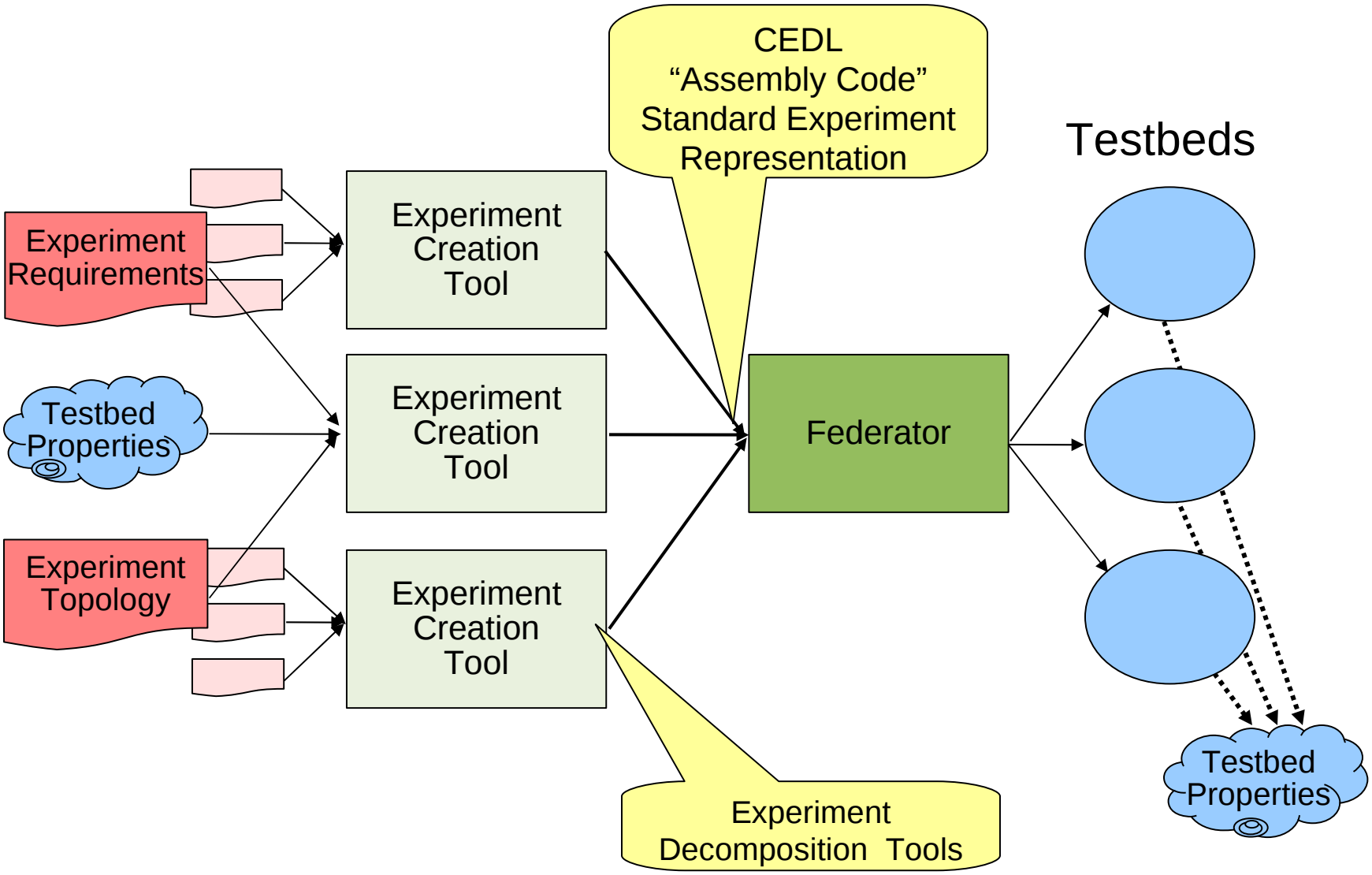
TIED is Dynamic Federation

- *On-demand* creation of experiments spanning *multiple*, *independently controlled* facilities

- Why?
  - Scale
  - Unusual facilities
  - Data & knowledge sharing
  - Information hiding - multiparty scenarios



TIED Federation Architecture

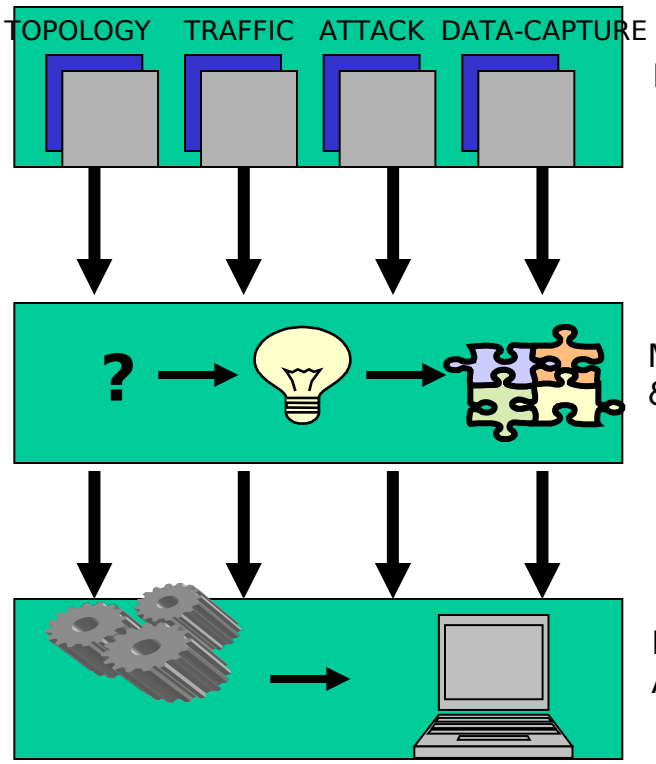


Slice Topology: CEDL
Canonical Experiment Description Language

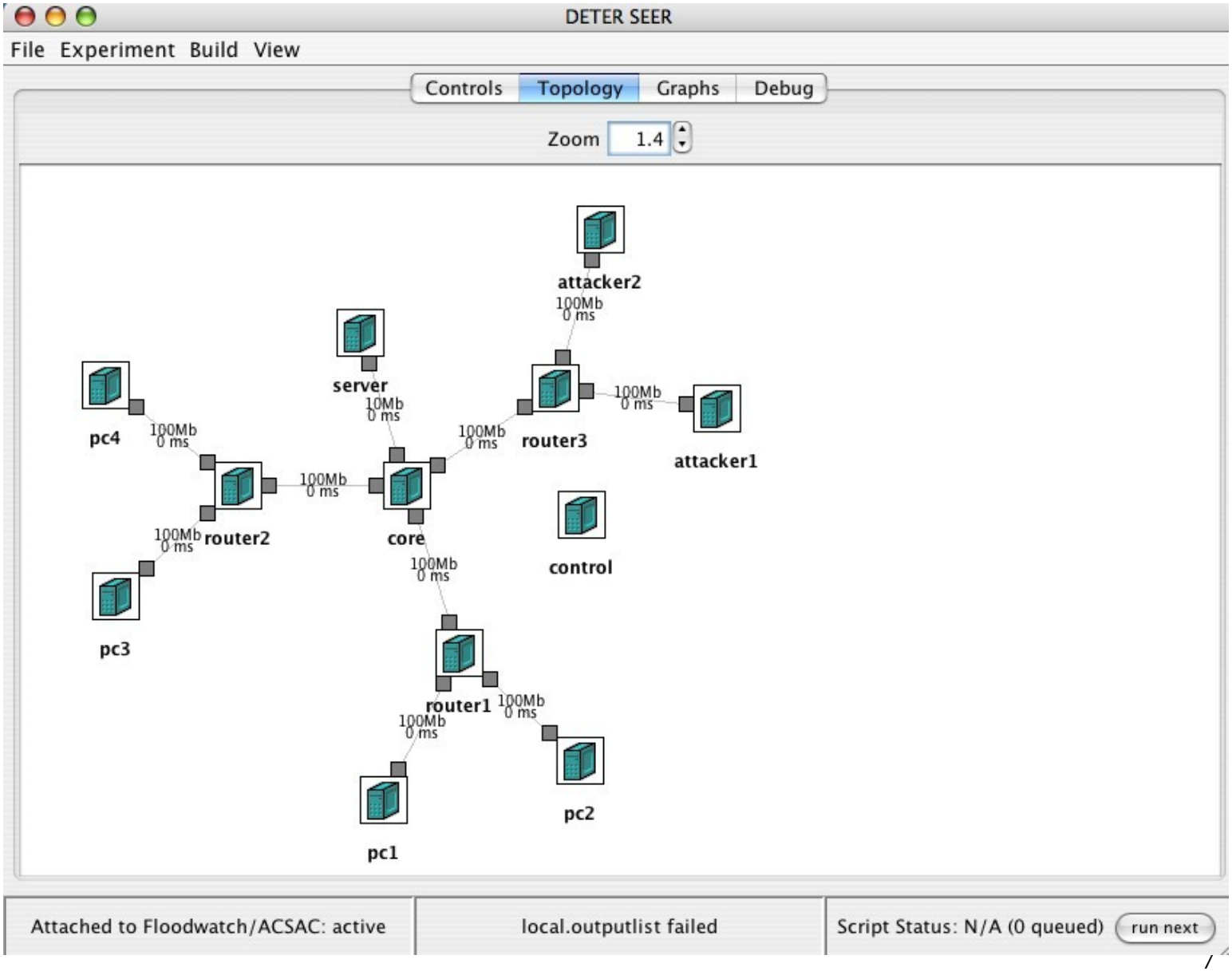
- Standard low-level experiment representation – “assembly code”
- Output of all tools / input to Federator

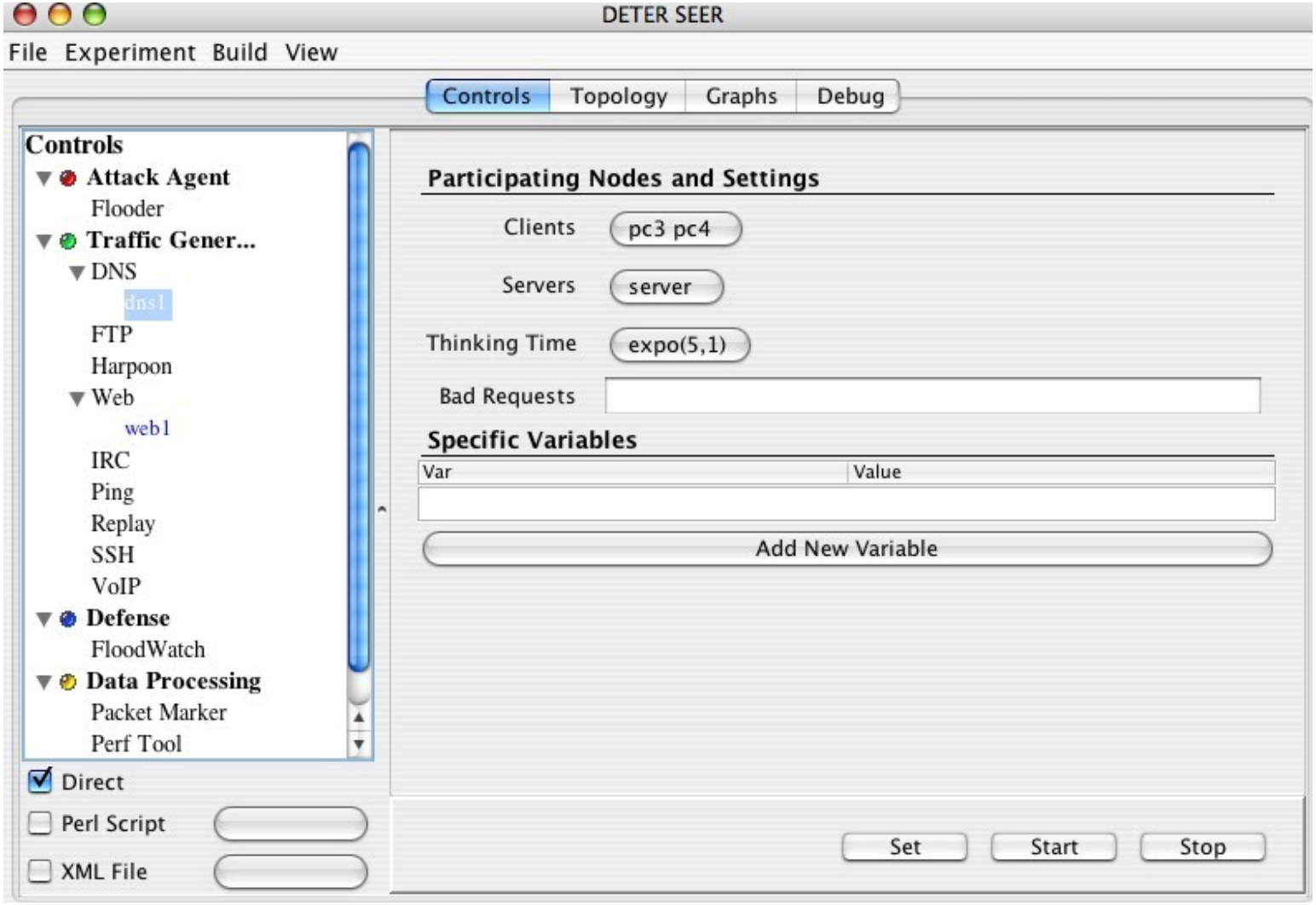
- Expressiveness (today):
  - Core semantics:
    - Logical {nodes, links, elements}
    - Topology (Emulab/ns2)
  - Annotations: logical attributes (eg, node type)
    - Type information: router, switch, etc.
    - Physical selection: map to specific instance
  - Annotations: physical attributes
    - “Escapes” to allow physical configuration of hardware

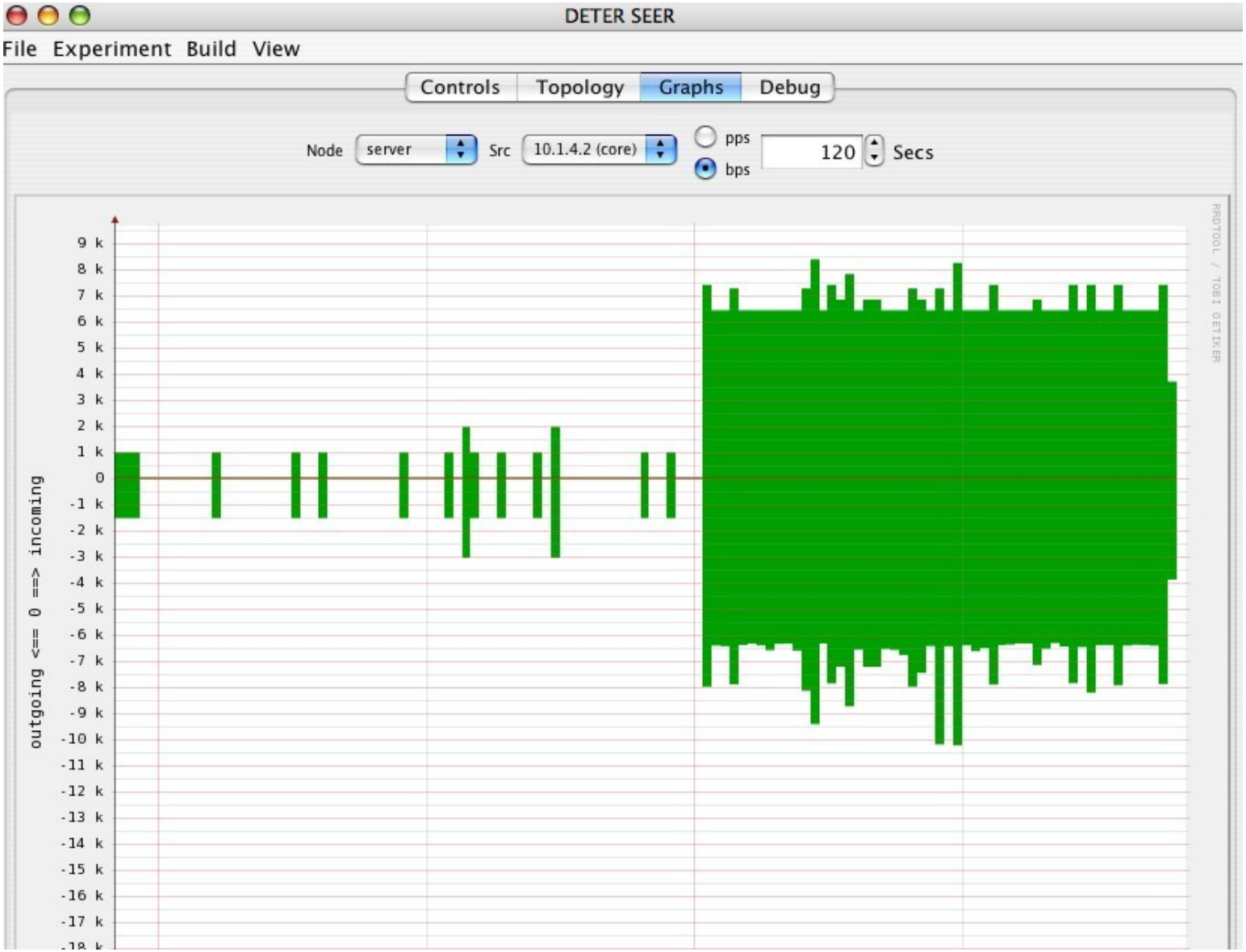
Experiment Methodology and The SEER Facility



- *Palettes* capture high-level "design patterns" for well-formed experiments: Topology, Background and Attack Traffic, and Packet Capture and Instrumentation. Skeleton palettes for original and customized experiments are also available.
- *Methodology Engine* frames standard, systematic questions that guide an experimenter in selecting and combining the right elements.
- *Experiment Automation* increases repeatability and efficiency by integrating the process to the TIED environment.


DETER SEER
File Experiment Build View
Controls Topology Graphs Debug
Zoom 1.4
attacker2
100Mb
0 ms
server
10Mb
0 ms
pc4
100Mb
0 ms
router3
100Mb
0 ms
attacker1
100Mb
0 ms
router2
core
control
pc3
router1
pc2
pc1
Attached to Floodwatch/ACSAC: active
local.outputlist failed
Script Status: N/A (0 queued)
run next


DETER SEER
File Experiment Build View
Controls
Topology
Graphs
Debug
Controls
Attack Agent
Flooder
Traffic Gener...
DNS
dns1
FTP
Harpoon
Web
web1
IRC
Ping
Replay
SSH
VoIP
Defense
FloodWatch
Data Processing
Packet Marker
Perf Tool
Direct
Perl Script
XML File
Participating Nodes and Settings
Clients
pc3 pc4
Servers
server
Thinking Time
expo(5,1)
Bad Requests
Specific Variables
Var
Value
Add New Variable
Set
Start
Stop


DETER SEER
File Experiment Build View
Controls
Topology
Graphs
Debug
Node
server
Src
10.1.4.2 (core)
pps
bps
120
Secs
outgoing <== 0 ==> incoming
9 k
8 k
7 k
6 k
5 k
4 k
3 k
2 k
1 k
0
-1 k
-2 k
-3 k
-4 k
-5 k
-6 k
-7 k
-8 k
-9 k
-10 k
-11 k
-12 k
-13 k
-14 k
-15 k
-16 k
-17 k
RRDTOOL / TOBI OETIKER

Conclusions

- Federation-based Slices Described in CEDL
  - Uniform slice description language
- Experiment Management in SEER
  - Extensible agent system
  - No architectural dependence on TIED
  - Implementation uses TIED facilities
- Ongoing work in TIED