TRIANGLE MICROWORKS, INC.
SOLUTIONS FOR COMMUNICATION PROTOCOL DEVELOPMENT
www.TriangleMicroWorks.com

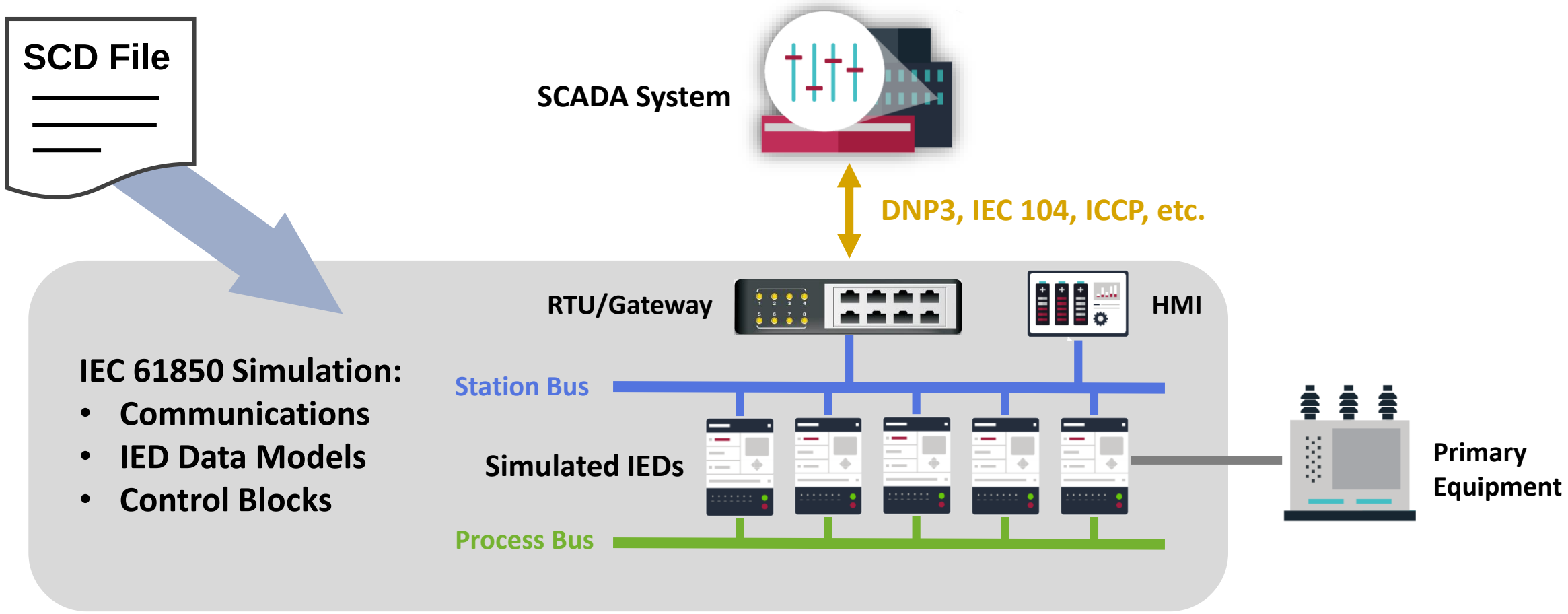
Communication Testing in Simulated IEC 61850 Systems

Joe Stevens
Marketing Manager
Triangle MicroWorks
jstevens@trianglemicroworks.com

Agenda

- Background on Simulated IEC 61850 Systems
- RTU/Gateway Example
- IEC 61850 Configuration Example
- Network Load Testing Example

Background on Simulated IEC 61850 Systems



Why Test With Simulated Systems?

Reduce Costs by Testing Earlier

- Discover configuration issues earlier in the engineering process
- Reduced costs by testing before acceptance testing or commissioning

Test Real Devices in Simulated Systems

- Test before all equipment is setup and configured
- Easily change test configurations

Reduce Time with Automated Testing

- Create tests that are highly manual in the real system
- Increase test coverage with repeatable and well documented tests

RTU and Gateway Testing

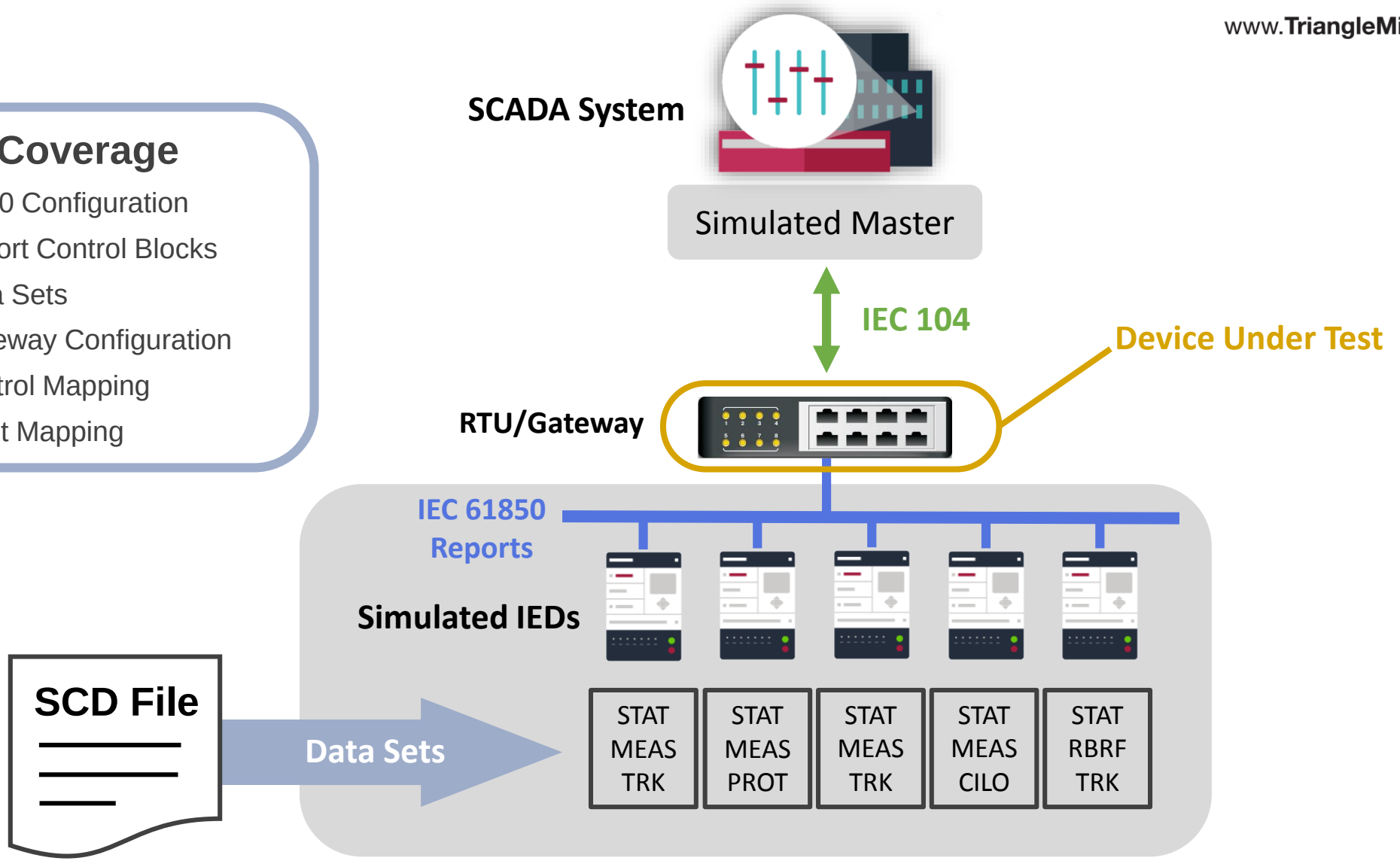
Testing Coverage

IEC 61850 Configuration

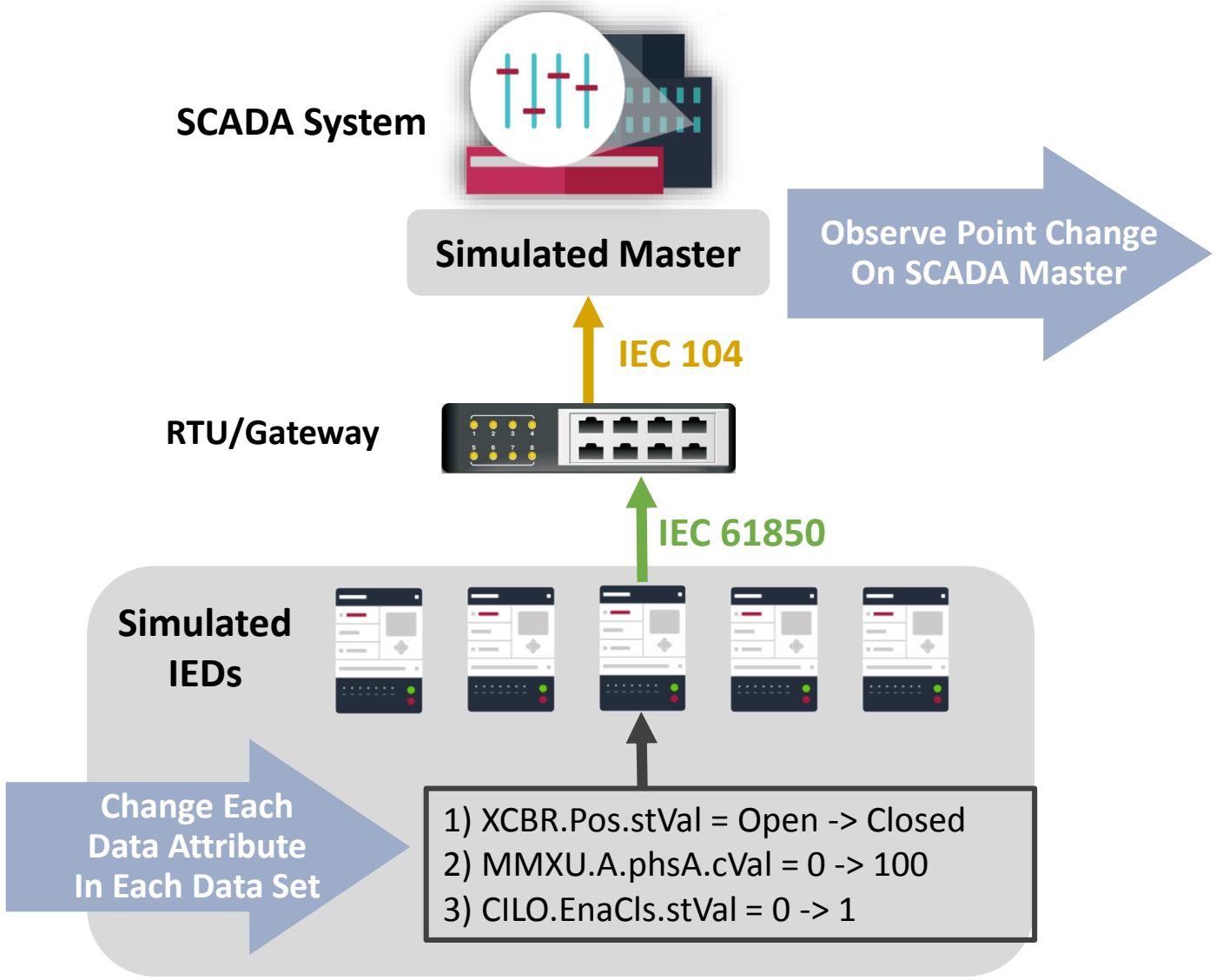
- Report Control Blocks
- Data Sets

RTU/Gateway Configuration

- Control Mapping
- Point Mapping



Automated Point Mapping Test



Observe Point Change On SCADA Master

Create Mapping Results

XCBR.Pos.stVal → M104.T3.P13

MMXU.A.phsA.cVal → M104.T13.P30

CILO.EnaCls.stVal → M104.T1.P34

CSWI.Pos.stVal → M104.T3.P31

MMXU.PhV.phsA.cVal → M104.T13.P33

CILO.EnaOpn.stVal → M104.T1.P35

IEC 61850 Configuration Testing

TRIANGLE MICROWORKS, INC.
SOLUTIONS FOR COMMUNICATION PROTOCOL DEVELOPMENT
www.TriangleMicroWorks.com

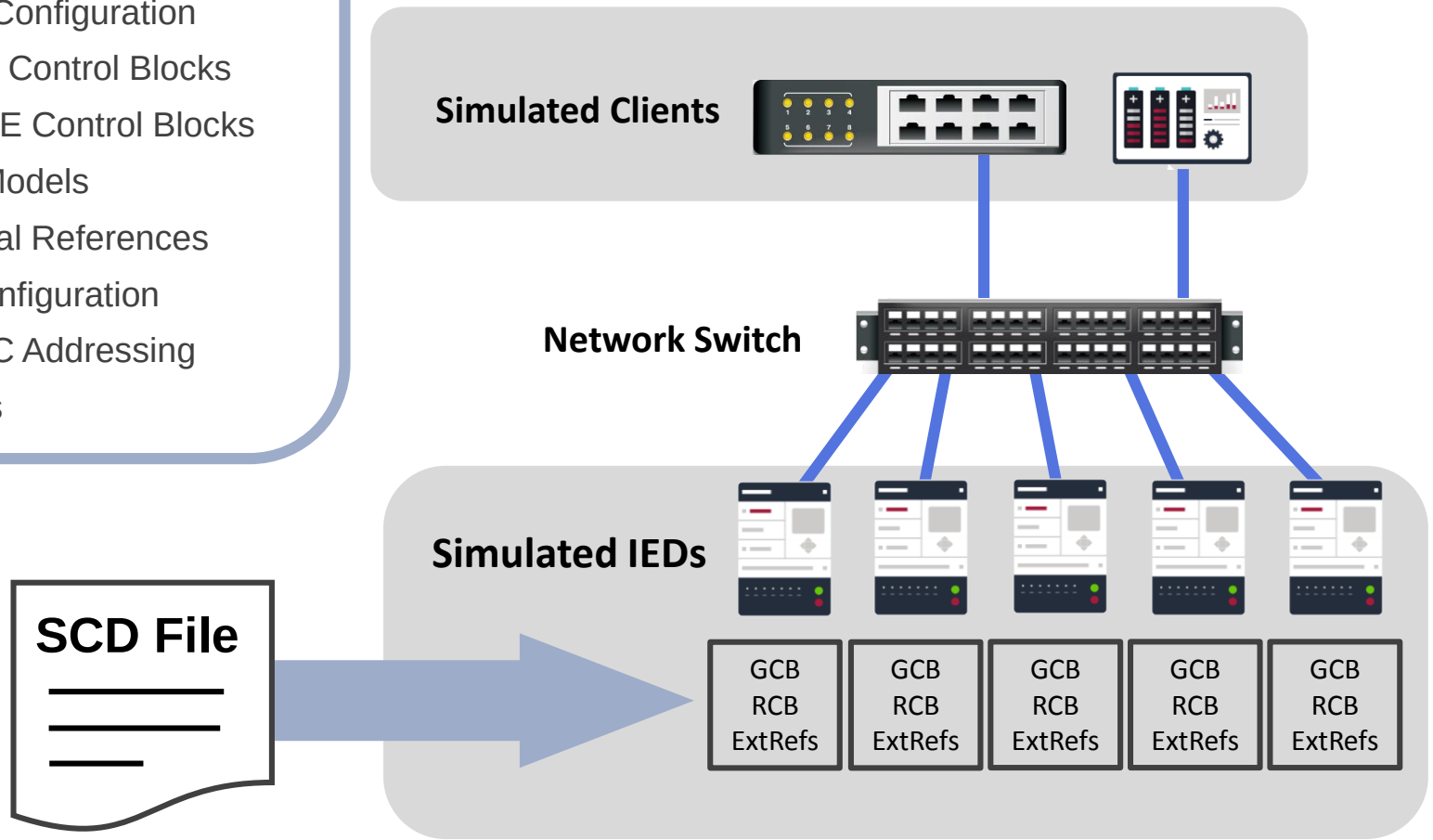
Testing Coverage

IEC 61850 Configuration

- Report Control Blocks
- GOOSE Control Blocks
- Data Models
- External References

Network Configuration

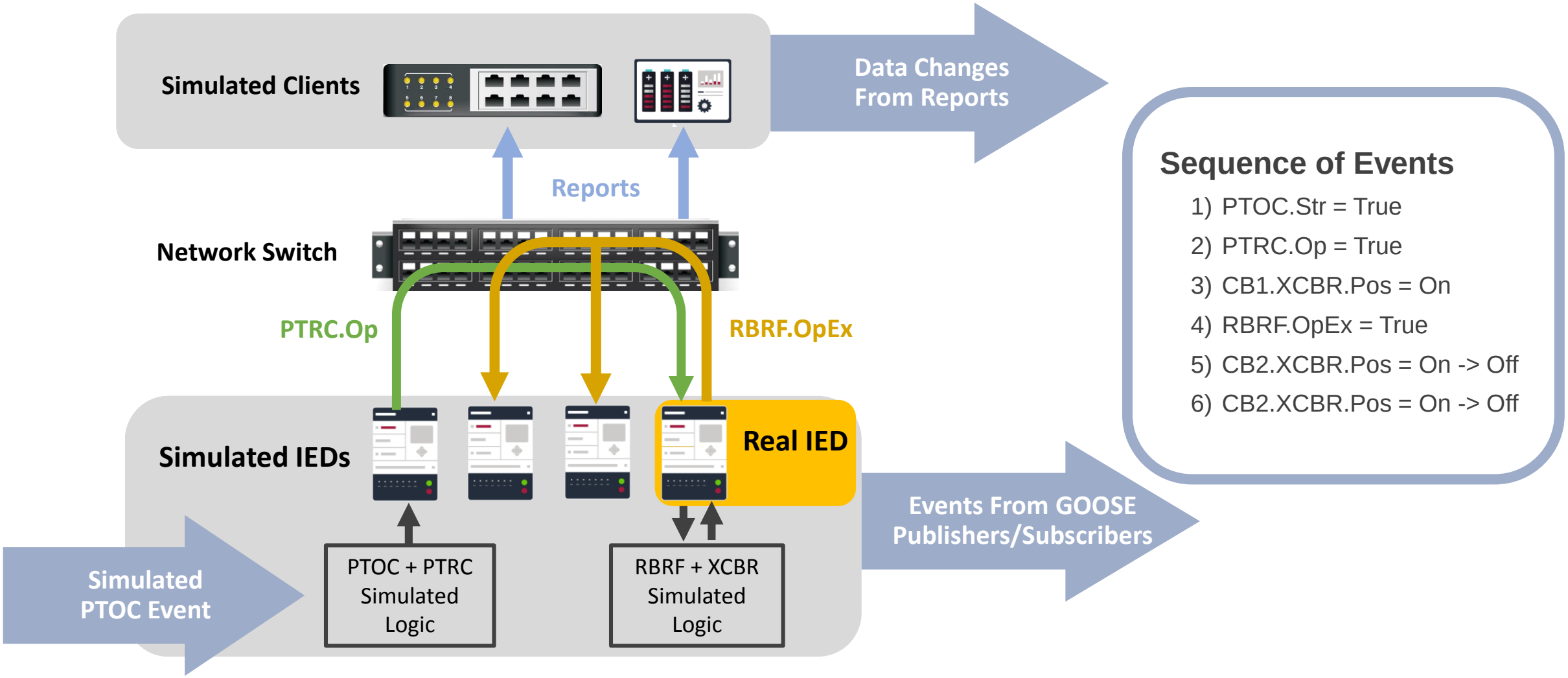
- IP/MAC Addressing
- VLANs



Devices Under Test

- Configuration Tool
- Network Switch
- IED

Breaker Failure Scenario



Sequence of Events

1) PTOC.Str = True
2) PTRC.Op = True
3) CB1.XCBR.Pos = On
4) RBRF.OpEx = True
5) CB2.XCBR.Pos = On -> Off
6) CB2.XCBR.Pos = On -> Off

Network Load Testing

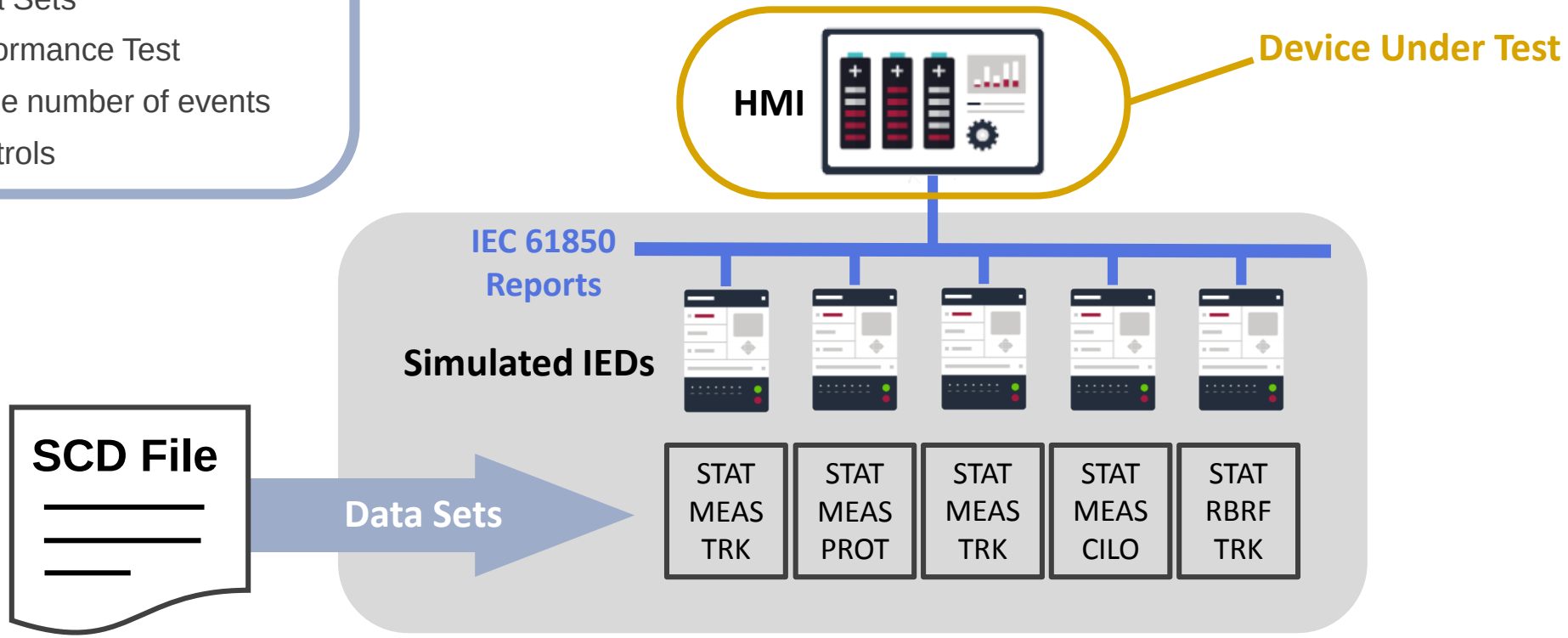
Testing Coverage

IEC 61850 Configuration

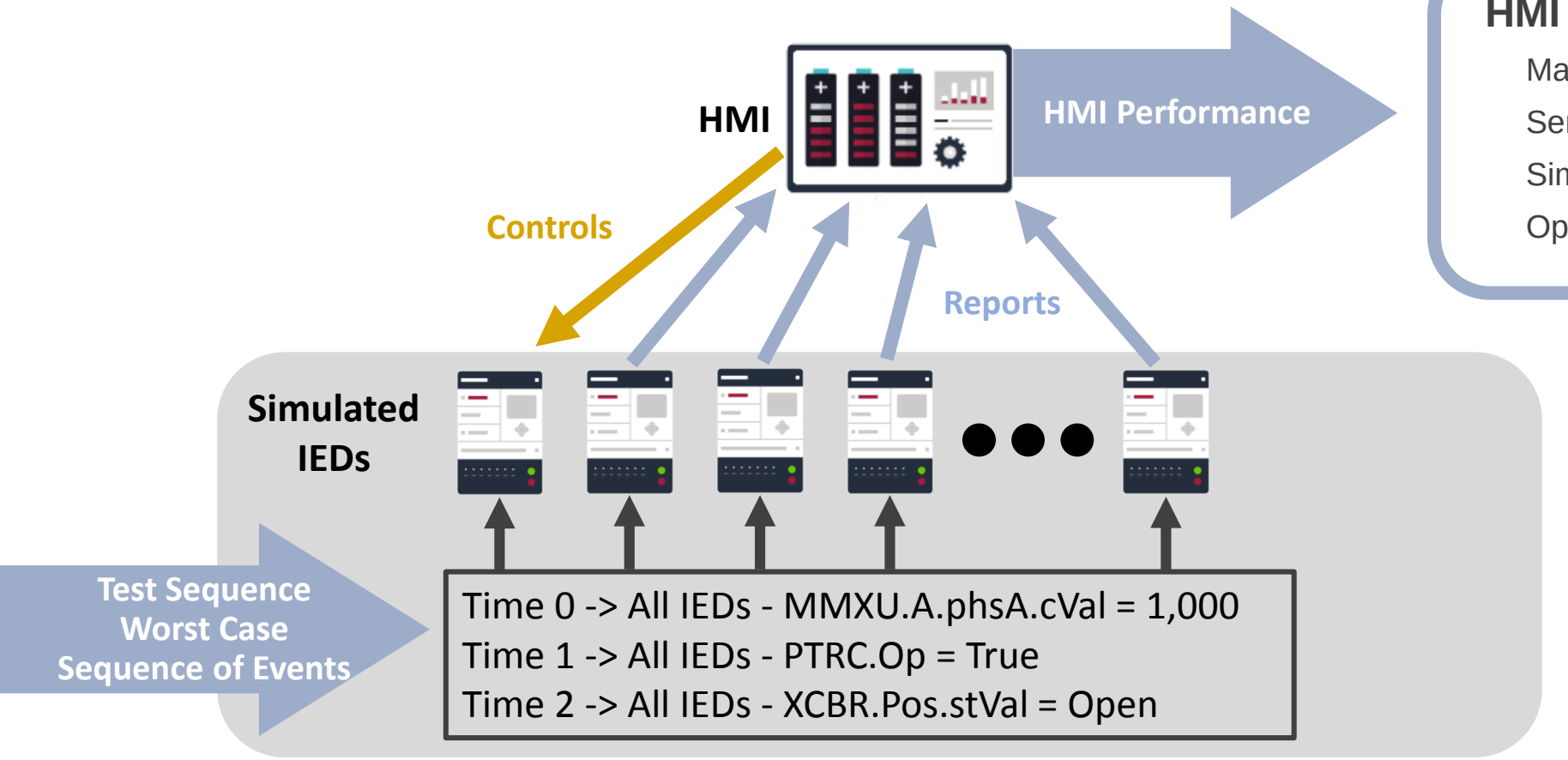
- Report Control Blocks
- Data Sets

HMI Performance Test

- Large number of events
- Controls



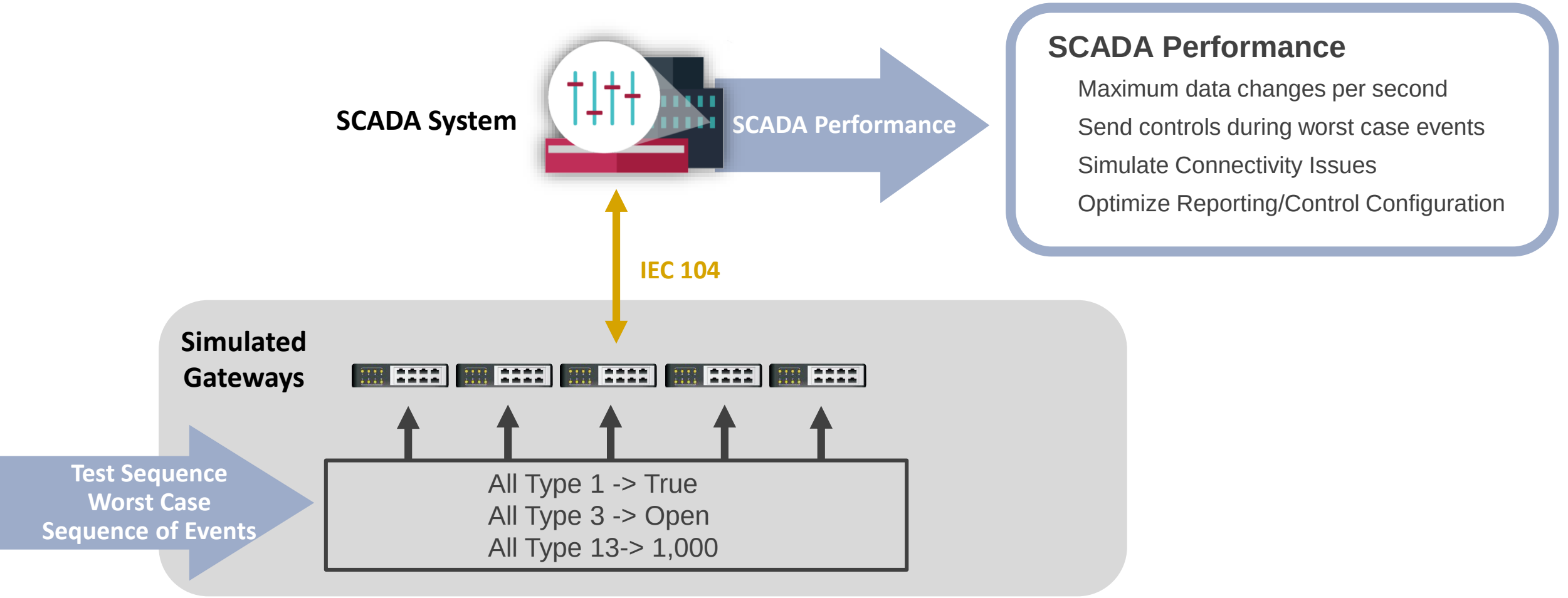
Worst Case Events for HMI



HMI Performance

- Maximum data changes per second
- Send controls during worst case events
- Simulate Connectivity Issues
- Optimize Reporting Configuration

Worst Case Events for SCADA



SCADA Performance

- Maximum data changes per second
- Send controls during worst case events
- Simulate Connectivity Issues
- Optimize Reporting/Control Configuration

Key Takeaways

TRIANGLE MICROWORKS, INC.
SOLUTIONS FOR COMMUNICATION PROTOCOL DEVELOPMENT
www.TriangleMicroWorks.com

Find Issues Earlier

- Discover issues at an earlier stage

Increase Test Coverage

- Test devices with entire system configuration

Take Advantage of IEC 61850

- Leverage the value of the system configuration approach (SCD File)

Tackle The Complexity

- System level analysis is necessary to verify configuration

Joe Stevens
Marketing Manager
Triangle MicroWorks
jstevens@trianglemicroworks.com