SIP Trunk Interworking:

How the SIP Forum is Improving Interoperability Between SIP-PBXs and Service Provider Networks

David Hancock – CableLabs

John Berg – CableLabs

James Swan – University of New Hampshire

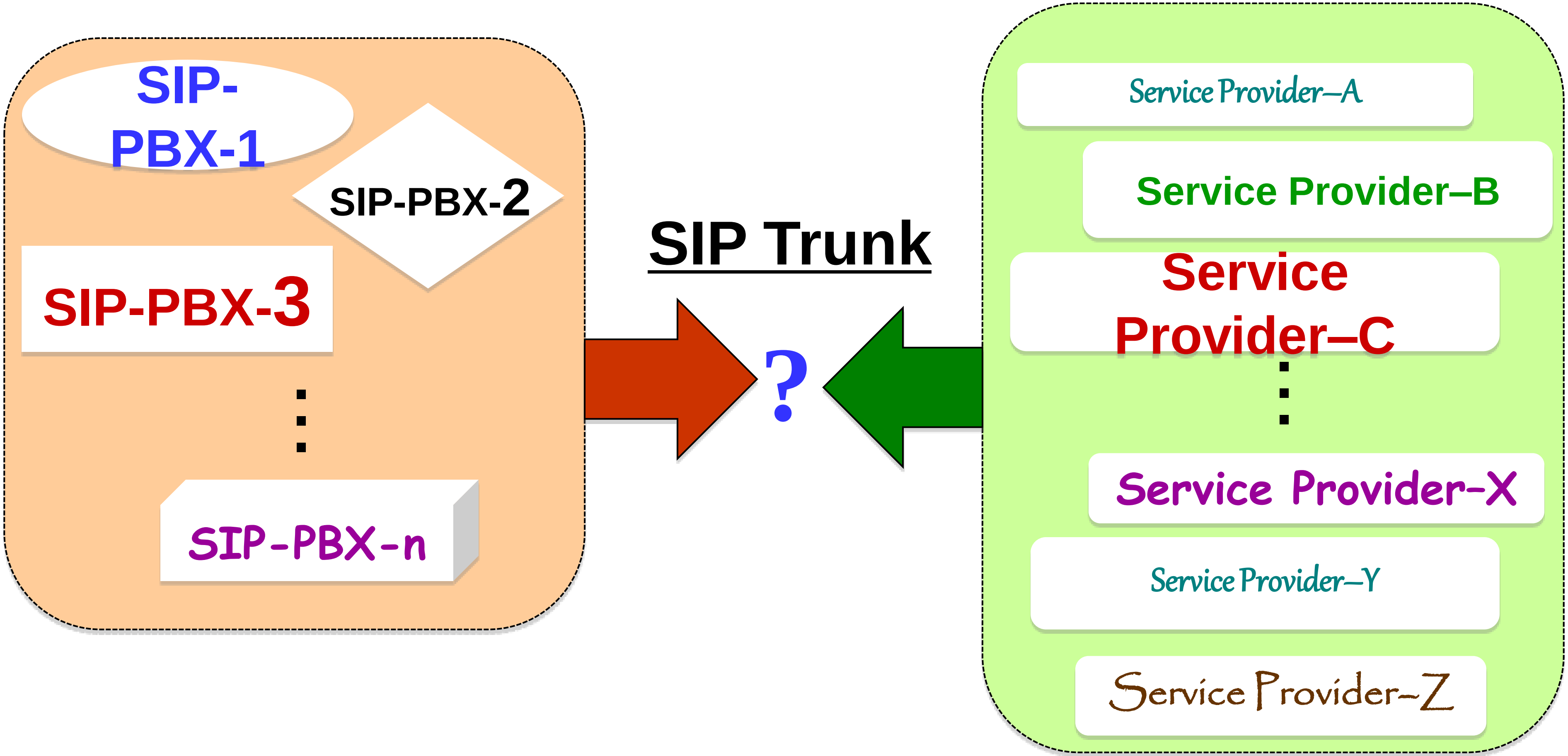
Agenda

- SIPconnect1.1 Recommendation (David Hancock)
- SIPconnect1.1 Interoperability Program (John Berg)
- SIPconnect1.1 Compliance Program (James Swan)
- Q & A

SIPconnect1.1 Recommendation

Problem: SIP Trunk Interworking Issues

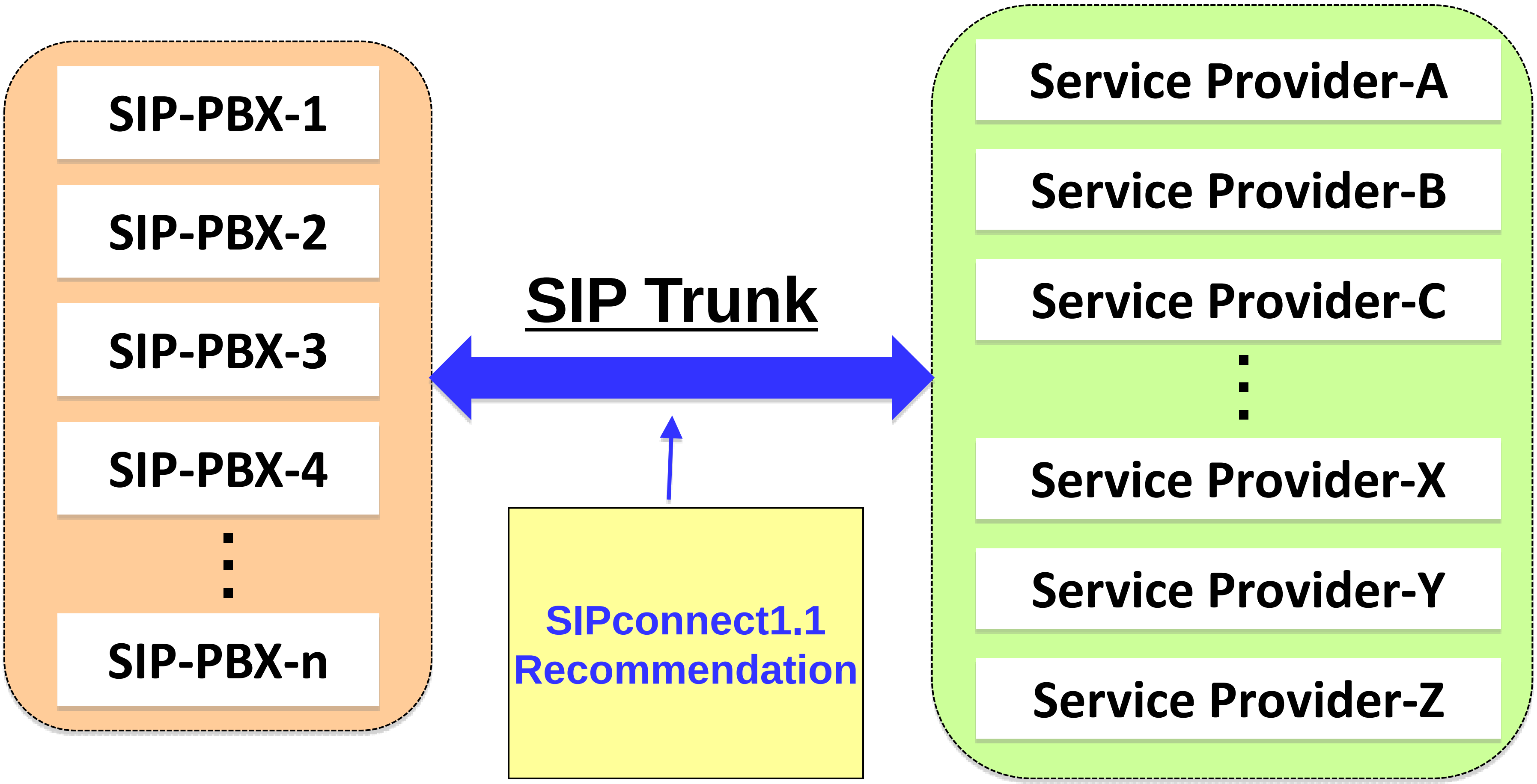
SIP Trunk products don't conform to a single SIP standard



Time/resources required to "qualify" each new PBX / SP-network combination

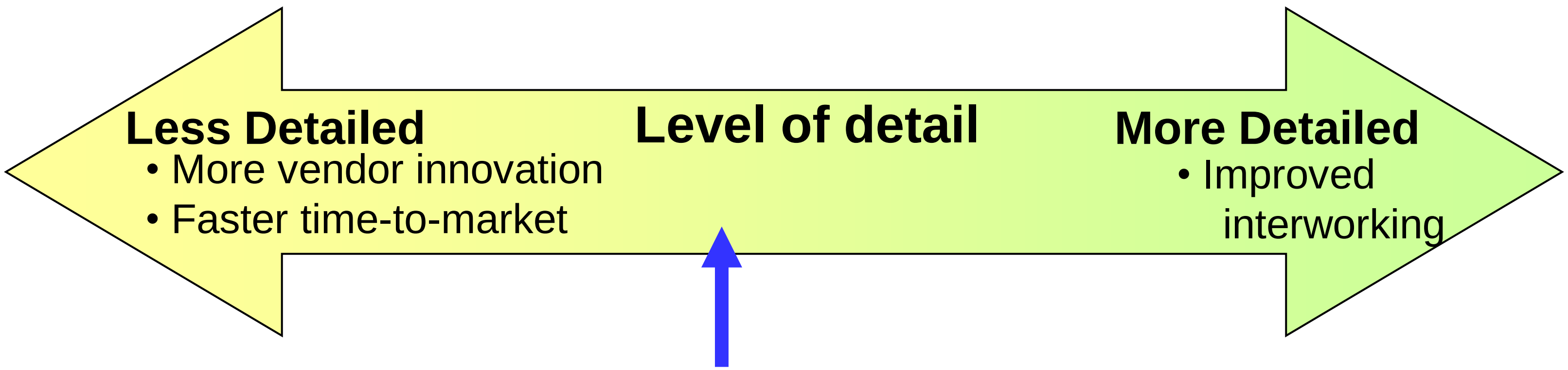
Solution: SIPconnect1.1

Defines a common SIP profile for SIP-PBXs and SP-SSEs



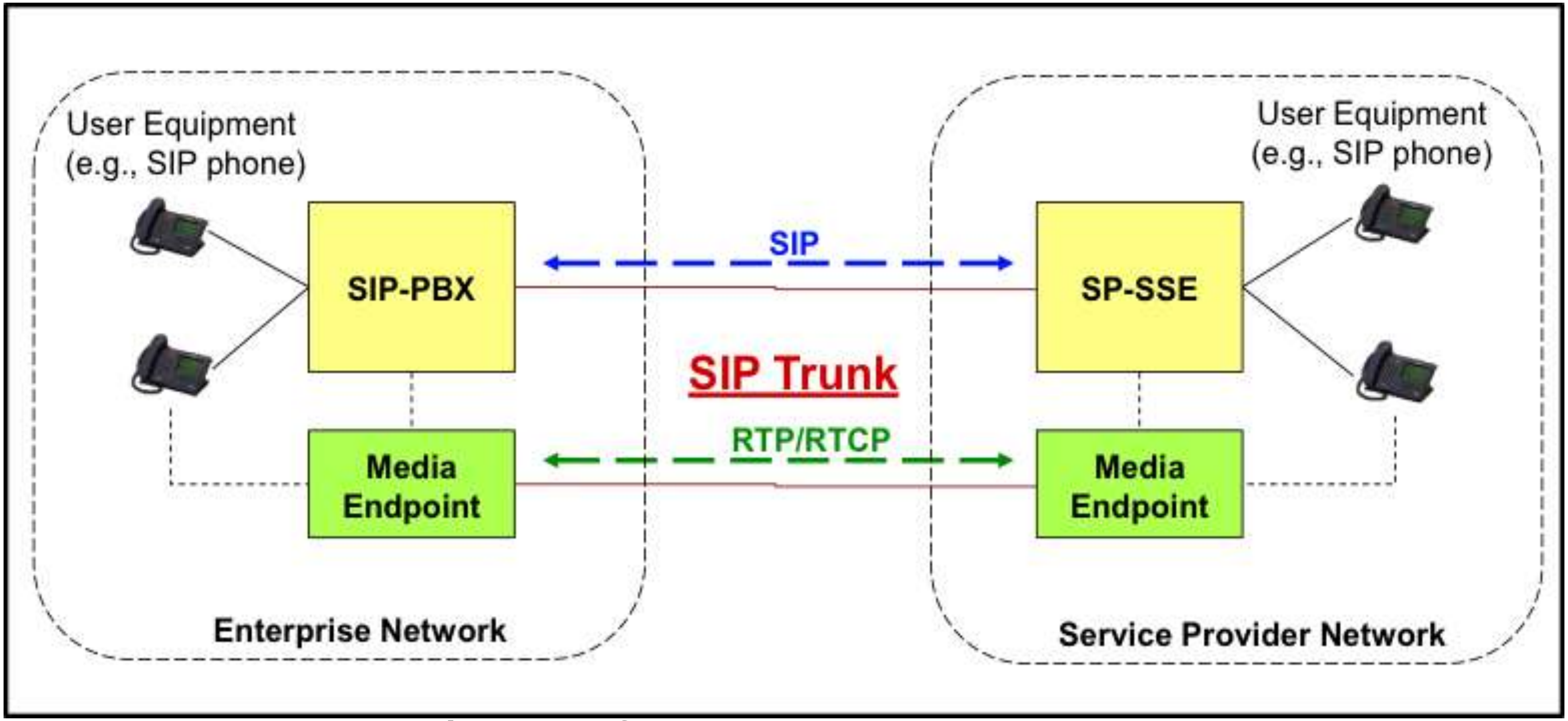
Guiding Principles

- Keep it simple
  - Support only basic SIP Trunk capabilities & features
  - Resolve the most common interworking issues
  - Minimize list of required SIP extensions
- Level of detail



- SIPconnect1.1 errs on the side of less-detail
- Future SC1.1 updates may nudge needle to the right

SIPconnect1.1 Recommendation



Documents MUST requirements for SIP-PBX, SP-SSE, and Media Endpoints

- Registration mode (GIN)
- Static Mode
- SIP Digest / TLS
- Basic Call Features

  - Direct Inward / Outward Dialing
  - Calling name/number delivery
  - Call Forwarding
  - Call Hold
  - Call Transfer
  - Emergency Calls
  - FAX & DTMF relay

SC1.1 Mandatory Standards

- SIP/SDP
  - IETF RFC 3261 SIP: Session Initiation Protocol
  - IETF RFC 3264 Offer/Answer
  - IETF RFC 3323 Privacy header
  - IETF RFC 3325 P-Asserted-Identity header
  - IETF RFC 3327 Path header
  - IETF RFC 4566 SDP: Session Description Protocol
  - IETF RFC 5876 Updates to Asserted Identity
  - **IETF RFC 6140 Registration for Multiple Phone Numbers in SIP (GIN)**
- Media
  - IETF RFC 3550 RTP
  - IETF RFC 3389 Comfort Noise
  - IETF RFC 4733 RTP Payload for DTMF Digits, Telephony Tones, and Telephony Signals
  - ITU-T T.38 Real-time Group-3 FAX over IP networks
- TLS
  - IETF RFC 5280 X.509 Public Key Infrastructure Certificate and Cert Revocation List Profile

New registration extension

Adoption of SIPconnect1.1

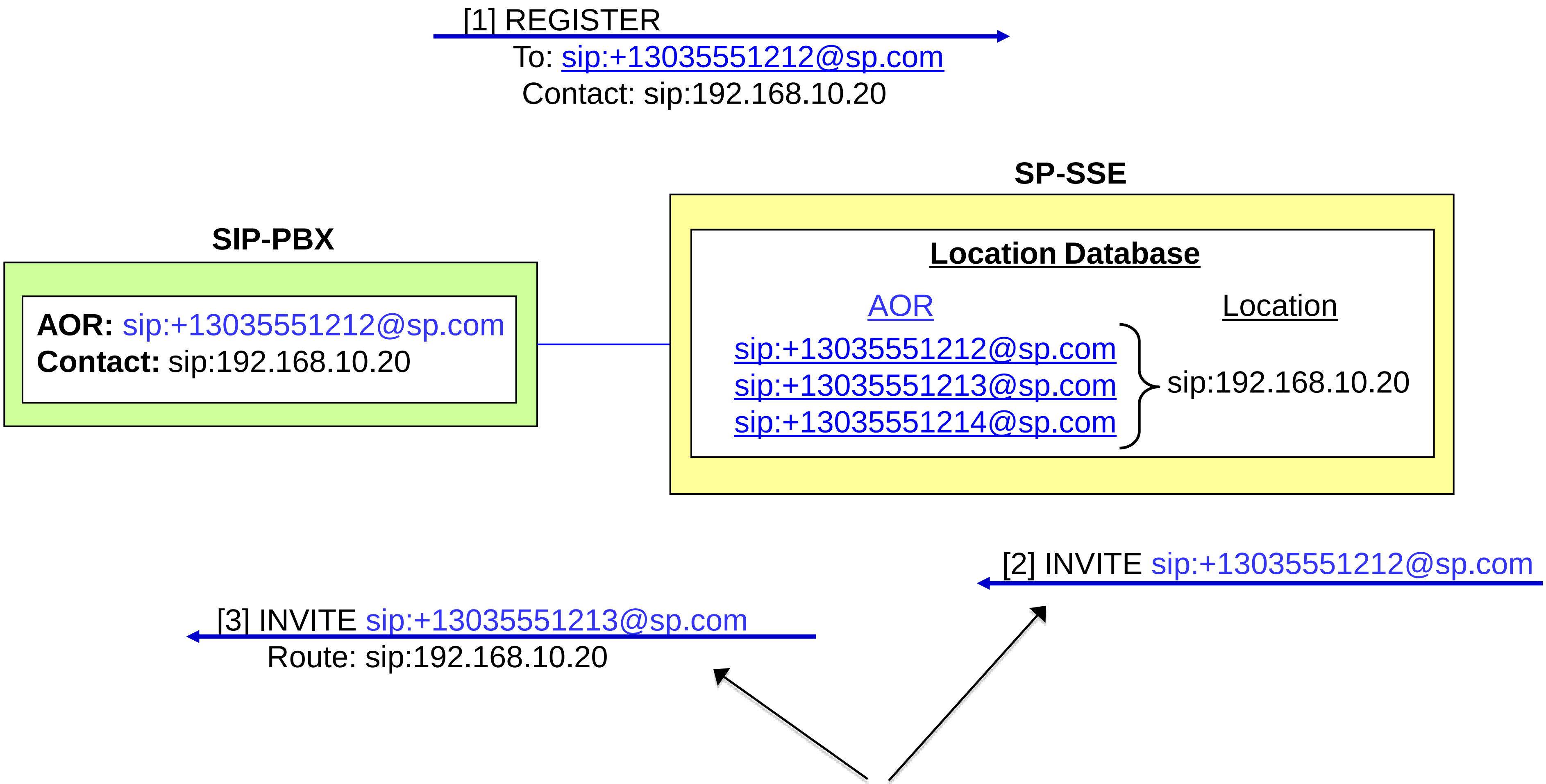
- Support in today's products (anecdotal)
  - Majority of procedures are commonly supported
    - It's mostly a configuration problem
  - Some procedures less widely supported
    - E.g., RFC 6140 (aka "GIN" Registration)
- CableLabs activities
  - Developed a SIPconnect1.1-compliant Reference Implementation based on Asterisk
  - Demonstrated "GIN" registration interworking between RI and two different Soft-Switch vendor implementations
  - Submitted RFC6140 patch to Asterisk open-source
- 3GPP activities
  - CT1 is adding support for RFC 6140 to IMS Rel-11

SIPconnect1.1 Enhancements

- Minimize changes to encourage adoption
  - Correct errors/ambiguities
  - Avoid scope increase
- Some updates already in pipeline
  - Enhance emergency procedures to align with industry standards
  - Correct registration issue; treat REGISTER for unknown AOR same as normal REGISTER
- Tech W-G may make additional updates (hopefully minor)
  - Resolve interworking issues discovered during interop testing
  - Fix errors/ambiguities reported by product developers
- Release date TBD

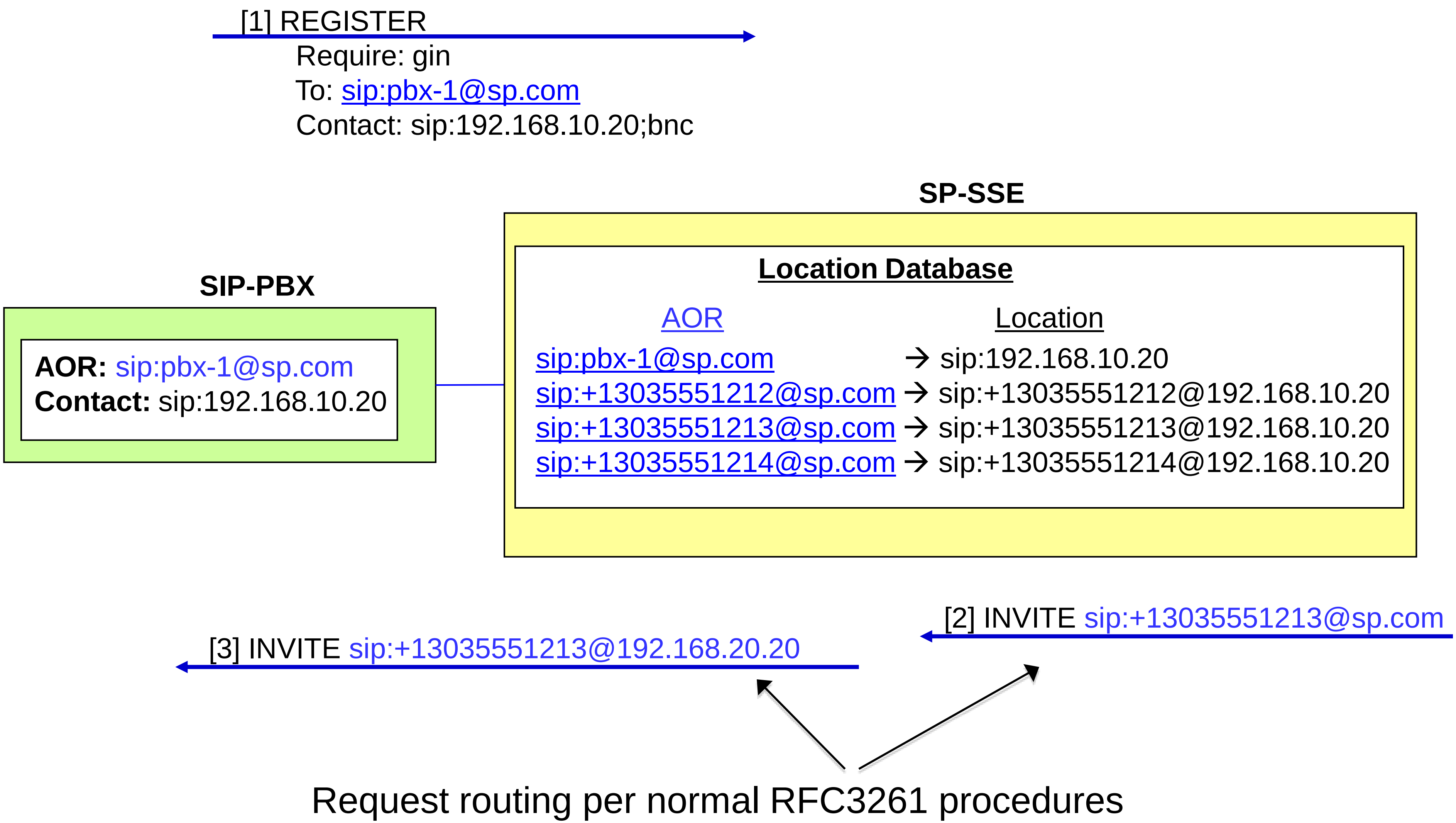
A quick look at "GIN" Registration

A non-SC1.1 Registration Variant



Potential routing problem: ambiguity over who "owns" sp.com

RFC 6140 (aka "GIN") Registration



Interoperability Test Program

SIPconnect-IT Task Group

- Goal
  - Accelerate industry adoption of SIPconnect1.1
- Co-chairs
  - Alan Johnston – Avaya
  - Robert Kinder - Cox
- Deliverables
  - SIPconnect1.1 Interoperability Test Program
  - SIPconnect1.1 Compliance Test Program

Scope of Interoperability Testing

- Evaluate ability of multi-vendor products to interoperate
- Tests based on requirements; looser approach
- Provide data on
  - Product readiness
  - Feedback to Technical Working Group
  - Test plan enhancements

Interop/Compliance Test Comparison

Interoperability Testing

- Focus on Interoperability
- Some degree of SC1.1 compliance
- Multi vendor testing
- No third party test tools
- Outcomes based on ‘what works’
- Includes tests for interworking issues

Compliance Testing

- Focus on requirements
- Full conformance testing
- Single product testing
- Test tools form the basis of testing
- Outcomes based on compliance
- SC1.1 MUST requirements only

Interop Test Plan Organization

SC1.1 Interop Test Plan

Requirements Testing

- Registration Mode
- Static Mode
- Security
- Basic Calls (DOD/DID)
- Business Voice Features
- Session & Media Interaction

Interworking Testing

Use Cases

- Early Media – DOD Call
- Call Forwarding Redirects
- Additional tests to be added

Registration & Static Modes

- Registration Mode
  - RFC 6140 (GIN) registration
  - Registration failures, retries and failover
- Static Mode
  - Statically configured routes from SP-SSE to SIP-PBX
- Common requirements
  - DNS
  - TCP
  - SIP Digest
  - TLS

Basic Calls /Business Voice Features

- Originating calls from the SIP-PBX (DOD)
- Originating calls from the SP-SSE (DID)
- INVITE messages are correctly formed
  - Request URI, PAI header, From header, etc.
- Business Voice features as defined in SIPconnect1.1:
  - Calling Name and Number Delivery
    - Ability to enable/disable privacy by the SIP-PBX and the SP-SSE
  - Call Forwarding
  - Call Hold
    - By both the SIP-PBX and the SP-SSE
  - Call Transfer
    - Includes Blind, Attended and Early Media scenarios
  - Emergency Services

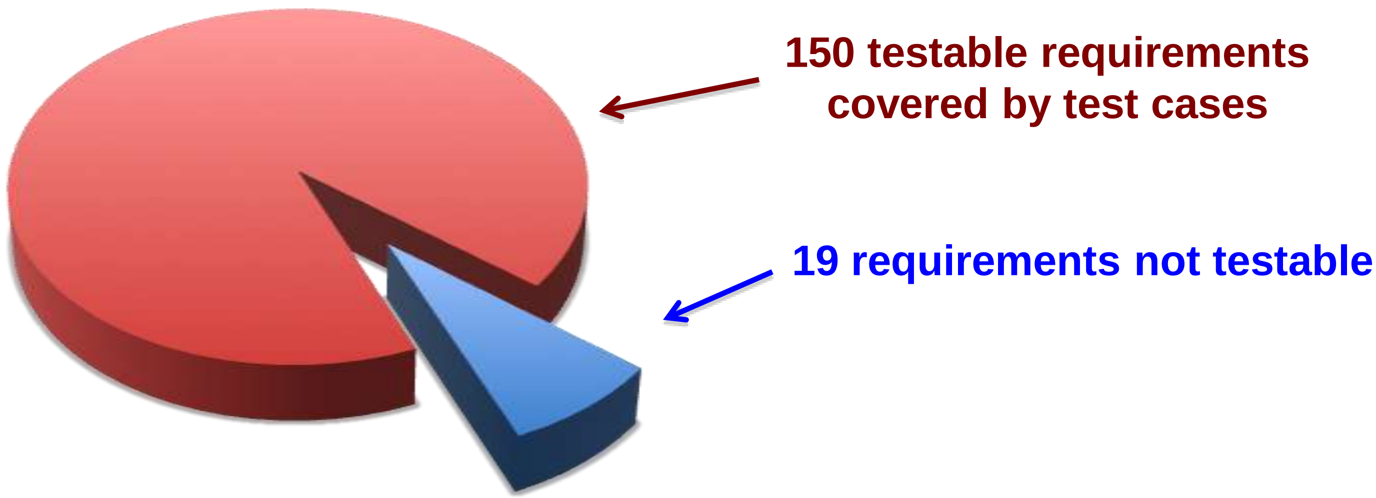
Media and Session Interactions

- SDP (RFC 4566)
- Offer/Answer Model (RFC 3264)
- Codec negotiation
  - Presently G.711 and G.729
- DTMF and telephone events (RFC 4733)
- T.38 fax

Interworking Issues

- Based on use cases derived from interoperability testing and observed issues in field deployments
- Replicate interworking issues between SIP-PBX and SP-SSE in a lab environment
- May point to further clarifications required in the spec
- Purpose is to identify potential interoperability issues between vendor products

Requirements Coverage



- 169 Total SC1.1 MUST requirements (SIP-PBX/SP-SSE)
  - Includes requirements from RFC 6140 for GIN registration
- Test Plan covers:

  100% of testable MUST requirements

  89% of all MUST requirements

Note: 19 requirements excluded from interop testing will be re-evaluated for compliance testing.

Next Steps

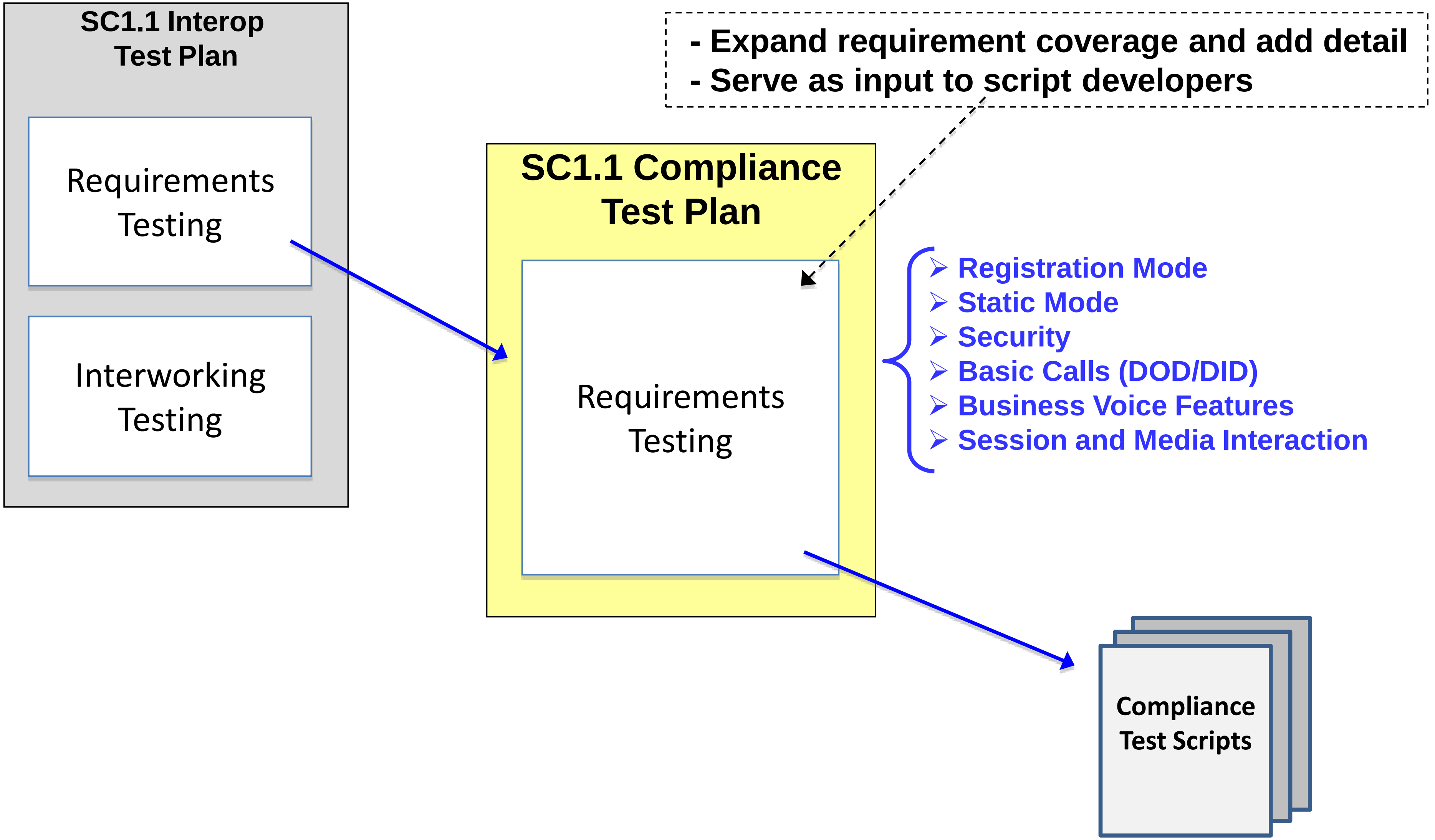
- Select venue for first interop
  - Tentatively scheduled for October
- Enhance interworking issues coverage
  - Current draft test plan available here
- Seeking participation in bi-weekly calls
  - Contribute to the scope of interops
  - Participate in developing compliance test program
- Participation will make this program successful

Compliance Test Program

Compliance Test Program Highlights

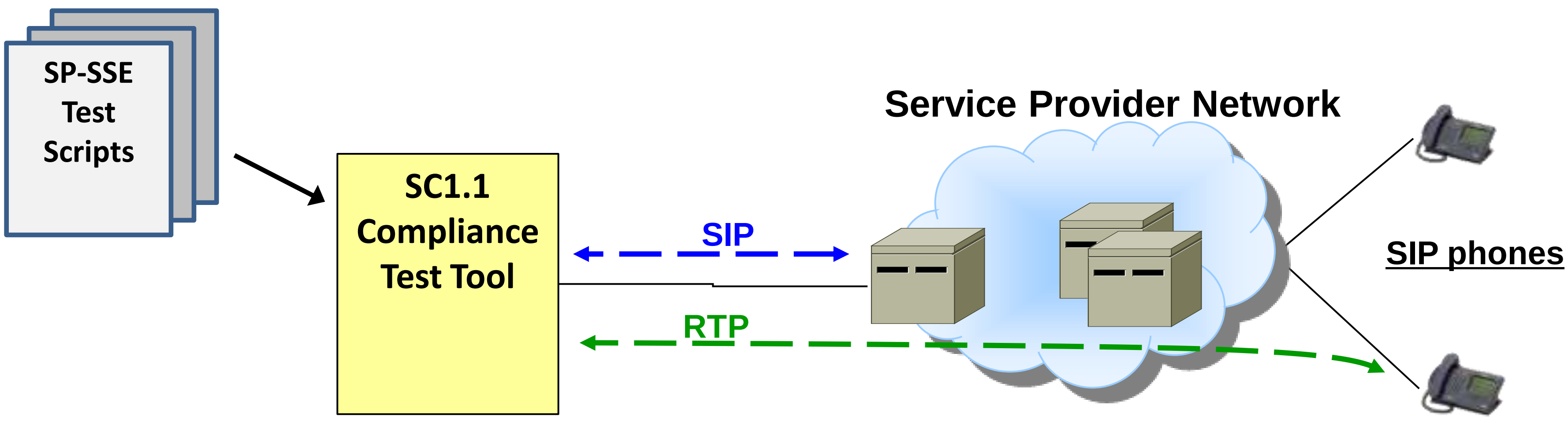
- Overall goal
  - Test product conformance with SIPconnect1.1 MUST requirements
- Deliverables
  - Compliance Test Plan (leverage Interop Test Plan)
  - Compliance Test Platform (tool-based)
  - Set of test scripts to test SP-SSE and SIP-PBX compliance with SC1.1
  - SIPconnect1.1 compliance branding program
- Start work Q3 of 2012
- Target program-ready date – Q1 2013

Compliance Test Plan



Compliance Test Platform

- SP-SSE test scripts emulate a SC1.1-complaint SIP-PBX to verify that Service Provider Network supports SIPconnect1.1 MUST requirements

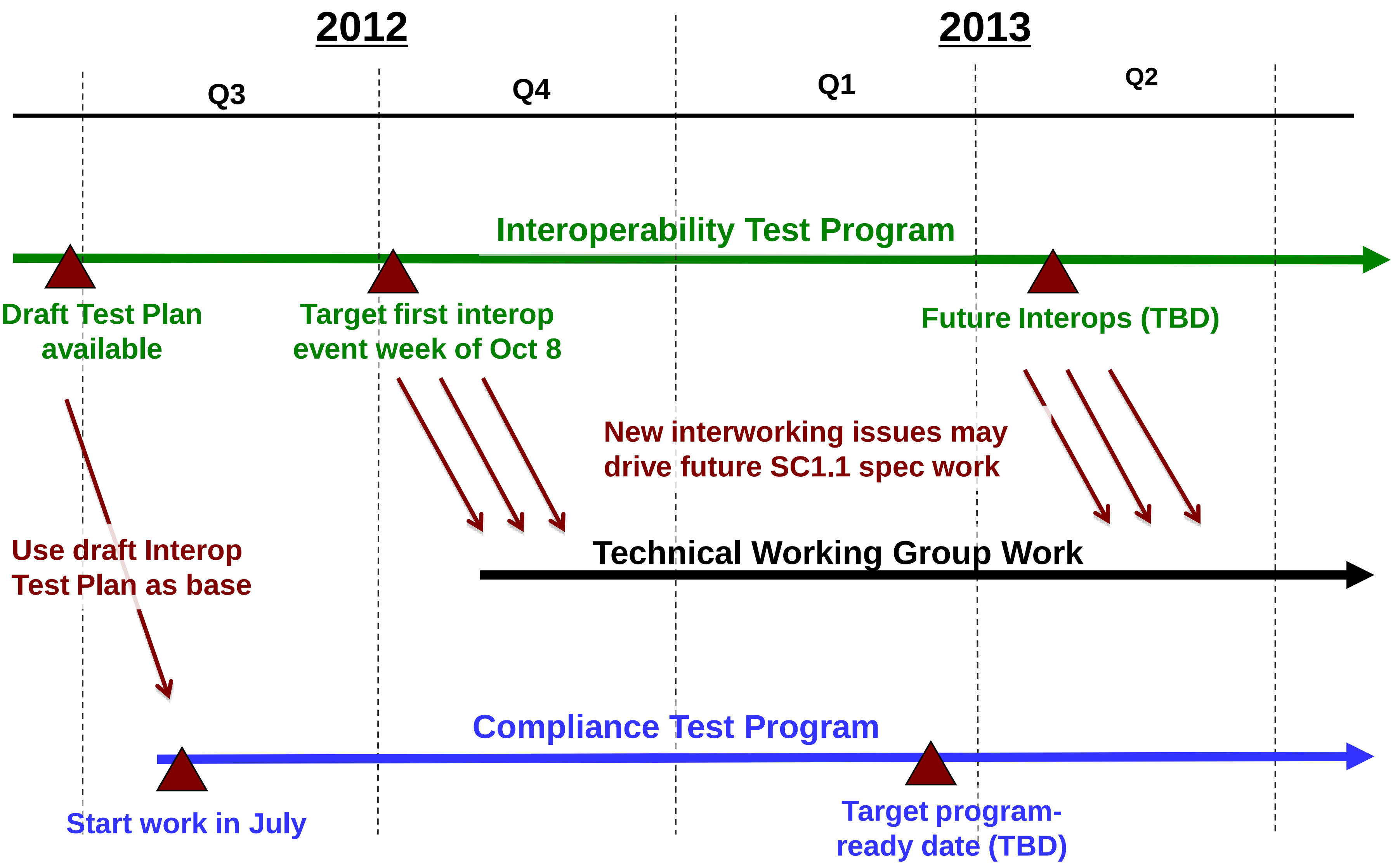


- A separate set of scripts emulating the SP-SSE would be required to validate compliance of SIP-PBX

Compliance Test Tools

- Several test tools are being evaluated
  - Should be automated/scriptable
  - Should be free / open-source
- CableLabs has contributed two test tools
  - SIPconnect1.1 Reference Implementation
    - Based on Asterisk
  - PCsim2
    - Scriptable test platform that emulates SIP call flows
  - Both tools capable of emulating SIP-PBX and SP-SSE
  - Tools will be available via SIP Forum web site

Interop/Compliance Program Timeline



Open Issues

- What exactly do we certify?
  – E.g., when SP-SSE is comprised of multi-vendor products
- How does branding address optional functionality?
  – E.g., Static vs. Registration mode
- Certification program lifecycles?
  - Compliance Test Tool TBD
  - Compliance Program launch date TBD

Questions/Comments?

Contact Us

- SC-IT mailing list
  - sipconnectit@sipforum.org
- David Hancock
  - D.Hancock@cablelabs.com
- John Berg
  - j.berg@cablelabs.com
- James Swan
  - jmswan@iol.unh.edu

Online Resources

- SC-IT Task Group Charter
  - http://www.sipforum.org/content/view/393/285/
- Mailing List
  - http://www.sipforum.org/mailman/listinfo/sipconnectit
- Document repository
  - http://www.sipforum.org/component/option,com_docman/task,cat_view/gid,120/Itemid,261/
- Draft Interoperability test specification
  - http://www.sipforum.org/component/option,com_docman/task,cat_view/gid,125/Itemid,261/