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INdigital SIP trunk interconnection

**a whitepaper guide to sip trunk
connections to the INdigital network**

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Overview:

This paper describes the various options a telecom service provider can use to establish SIP trunk based connections to the INdigital network. SIP interconnection allows service providers to deliver E911 calls for service to the INdigital 911 network, which will then result in the call being routed to the appropriate answering point.

INdigital's network is based on the **RFC-3261** standard, generally available at the IETF website (here by reference:) <http://tools.ietf.org/wg/sip/>

Currently, INdigital is not explicitly supporting other SIP extensions, e.g. RFC-3262 (reliability) or others.

If the need arises to support services and protocols such as 183 - early media or provisional ACKs, these specifics can be negotiated per interconnect development, and a suitable technology bridge will be proposed and developed to meet the parties needs.

1) SIP Interconnection specifics:

A). Transport Facilities: The recommended method of SIP Interconnection to INdigital is a private, managed IP connection between the telecom service provider and INdigital's network.

- 1). Secure IP tunnels over commodity internet connections can be supported, and may be used for development work.
- 2). For live traffic, INdigital recommends a dedicated, private connection arrangement. IP termination over T-1 or a similar digital transmission circuit is a common method of transport. The service provider's transport facility can terminate to any of INdigital's POP locations. A list of these locations is available to our business partners.
- 3). INdigital recommends the use of redundant and diverse facility arrangements and redundant hardware where possible to maximize resiliency and reduce any single point of failure.

B). Transport Protocol: The INdigital network currently supports IPv4 connections. IPv6 is not supported at this time due to the immaturity and emerging support of the protocol.

C). SIP Termination: The INdigital network has multiple SIP proxies available for SIP termination. SIP termination is, however, an inexact science, and the exact method will need to be engineered on a case by case basis, thereby defining the method of interconnection.

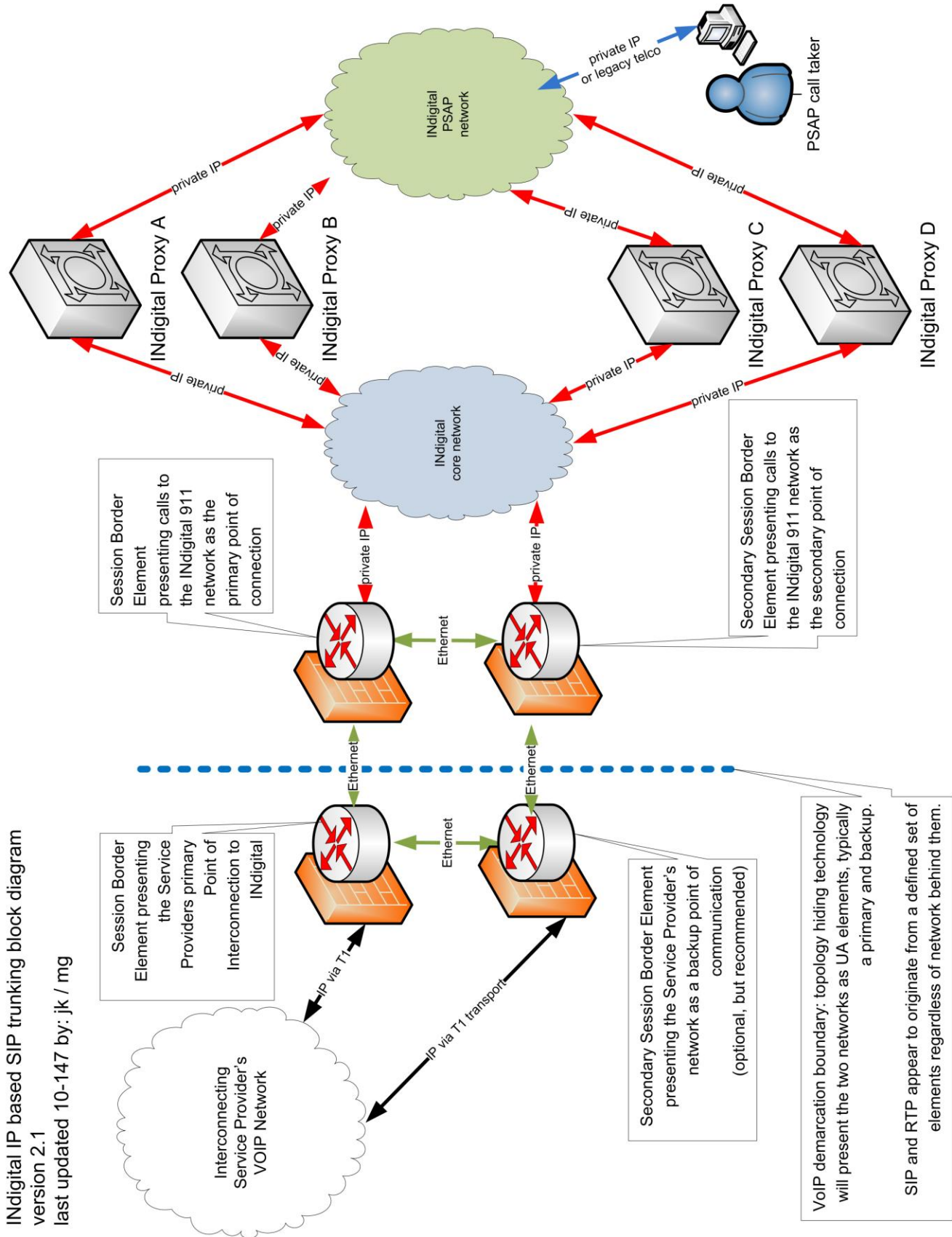
1). Both unsolicited endpoint and UA registration methods are supported. The method will be chosen based upon the capabilities of the service provider. See attached drawing for an example peer-to-peer interconnection.

D). Security Measures: INdigital requires that the Carrier use some form of Session Border Control at the Network Handoff Location. Primarily used for topology hiding, RTP proxy and normalization of the SIP protocol, Cisco's UBE technology is recommended. If the operating company cannot provide such SBC functionality, INdigital can consult on or suggest a configuration that will be supported.

E). Call Signaling: SIP Call Signaling will use 911 as the called party number in cases where the ESN is not already known, i.e for calls that are non pre-selective routed. The Calling Party number or P-ANI/ESRK or ANI can be used if the ESN of the Emergency Services Agency is known. The ESN can be signaled using INdigital's ESN number as called party. Currently only Called and Calling party fields are used for selective routing within the IN911 network.

F). Geo-Routing: The ability to geo-route calls using PIDFlo body or header fields is currently under development. Contact INdigital for an expanded discussion of this service feature, which is defined in RC-2778 and RFC-4119.

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INdigital IP based SIP trunking block diagram
 version 2.1
 last updated 10-14-17 by: jk / mg

INdigital contacts

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Glossary of Terms

- ANI:** Automatic Number Identification, describes the actual telephone number of a calling party.
- ESN:** Emergency Service Number, a numerical identification for a specific emergency service provider. In this case used to assist in routing Emergency Calls for Service.
- ESRK:** Emergency Service Routing Key. This generally describes a non-dialable telephone number used as a record reference number for looking up caller location information for wireless, or similar nomadic type calls, for emergency services. See also P-ANI
- IETF:** Internet Engineering Task Force. A standards setting body for the development and adoption of recommended standards defining IP and SIP protocols (among others.)
- INdigital network:** A private IPv4 voice and data network owned and operated by INdigital telecom. The network can receive, selectively route and deliver E9-1-1 telephone calls (public to authority) to emergency communications centers throughout the state of Indiana using VoIP technology.
- IP:** Internet Protocol. Also referred to as IPv4 in this white paper to specify that the network operates using Internet Protocol version 4.
- P-ANI:** Pseudo Automatic Number Identification. See also ESRK
- PIDF-LO:** Presence Information Data Format Location Object.
(See also RFC 2778 and RFC 4119)
- POP:** Point of Presence
- RFC:** Request For Comments – a distributed method of the development of standards used by the IETF.
- RTP:** Realtime Transport Protocol
- SBC:** Session Border Controller, is a network element used in VoIP networks to exert control over the signaling (and usually the media streams) involved in setting up, conducting, and tearing down telephone calls or other interactive media communications.

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SIP: Session Initiated Protocol

T-1: A digital transmission link with a signaling speed of 1.544 Mbps.

UA: User Agent

UBE: Unified Border Element

VoIP: Voice over Internet Protocol

Appendix A

This appendix contains the physical address and NPA-NXX of the IN911 SIP gateways. This appendix is for preliminary planning purposes only. The information needed to place orders for interconnection will be provided upon successful validation of the Carriers ability to meet the requirements of IN911 network operator for security and interconnection stability.

The information contained in this appendix is

Private and Confidential.

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