

# An introduction to **SS7** and its support in **Asterisk**

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# Presentation Objectives

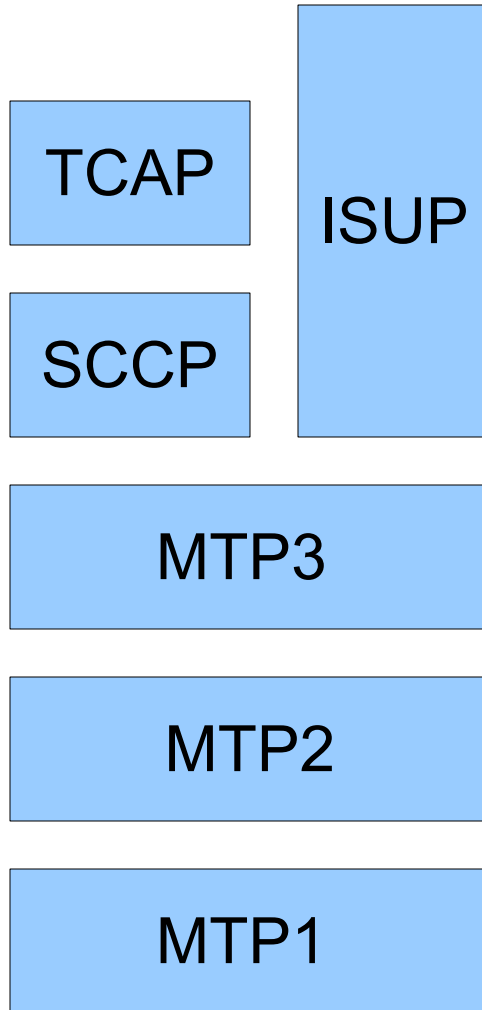
- To...
  - Give an overview of the SS7 protocol.
  - Talk about some of its uses and the reasons why one would use SS7.
  - Announce the capability of Asterisk to interoperate natively on the SS7 network.
  - Talk about configuration of Asterisk using SS7 for call transport.

# What is SS7?

- CCS Protocol for controlling bearers
  - 1+ signalling channels
  - Up to 16,384 bearers (for ANSI style) per linkset.
- Carrier Grade Protocol
  - Used by carriers to interconnect call traffic
  - Used also for call services to large customers.
  - Sometimes preferred over PRI in some parts of the world.

# What is SS7?

- Like PRI different forms, although two main ones are:
  - ITU/ETSI – International variant
  - ANSI – US variant
- Each node has an address on the network called a point code. (Like IP)
  - ANSI xxx-xxx-xxx (1-2-3)
  - ITU single decimal or hex value (1234)



ISDN User Part – Call Signalling Layer (like Q.931)

Routing and Message Distribution Layer (Point Codes)

Transport Layer (like Q.921, CRCs and HDLC)

Physical Layer (T1/E1 timeslot)

# Why Asterisk and SS7?

- Necessity + Startup Cost - “The SS7 tax”
  - Traditional equipment is expensive
- Utility
  - Asterisk is a really great application server. It also can bridge a lot of different protocols together of different technologies.
- Long-term Cost
  - Lower per-minute interconnect rates
- Need additional data about call unavailable in PRI/ISDN

# Libss7 - Current Capabilities

- MTP2 implementation
  - T1/E1 transport, 64kbps and 56kbps signalling links
- MTP3 implementation
  - everything necessary for call control
- ISUP
  - Call control related messages
- Supports ITU and ANSI style
  - Variants are easy to add

# Why libss7? (versus others)

- GPL! - Source freely available making custom SS7 modifications possible.
- FREE! - No expensive upfront cost or reoccurring license fees.
- HIGH PERFORMANCE! - Dual core 1.8Ghz AMD with 2xTE420Ps averages over 110,000 calls per day.
- ULTRA RELIABLE MTP2! – Runs in kernel at interrupt priority (highest in operating system).

# Debugging Tools

- `ss7linktest` (in `libss7` sources)
  - `ss7linktest [sigchan number] [itu or ansi] [OPC] [DPC]`
  - OPC and DPC have to be in decimal format
  - Used to debug initial alignment problems

# Helpful CLI Commands

- `ss7 show linkset x`
  - Shows linkset status (Up or Down)
- `ss7 debug linkset x`
  - Shows debug message output for all messages sent and received on linkset.
- `ss7 [un]block linkset x`
  - Sends a notification to the other end to stop/start sending calls on all bearers on the linkset.

# Useful Channel variables

- SS7\_CHARGE\_NUMBER
- SS7\_GENERIC\_ADDRESS
- SS7\_JIP
- SS7\_GENERIC\_DIGITS
- SS7\_GENERIC\_DIGTYPE (type of generic digits)
- SS7\_GENERIC\_DIGSCHEME
- SS7\_ORIG\_CALLED\_NUM
- SS7\_LSPI\_IDENT (next three are used for RLT support on DMS switches)
- SS7\_CALLREF\_IDENT
- SS7\_CALLREF\_PC
- SS7\_CALLING\_PARTY\_CATEGORY
- SS7\_REDIRECTING\_NUMBER
- SS7\_GENERIC\_NAME

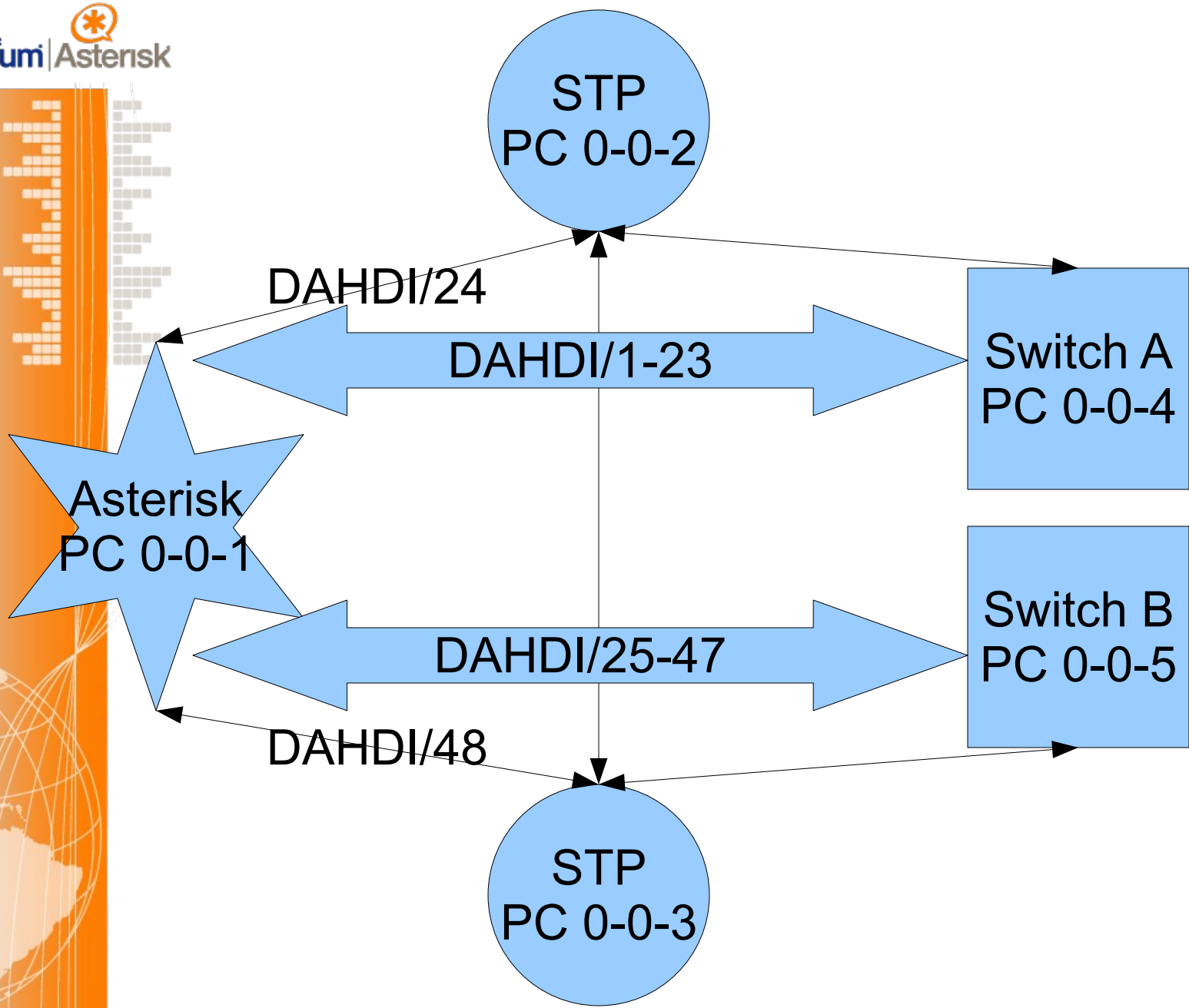
# Helpful Information

- `ss7_explicitacm=yes`  
(`chan_dahdi.conf`)
  - Allows you to send ACM explicitly from the dial plan using `Proceeding()`
- `Ringin()`
  - This dial plan application will send CPG with alerting indication
- `Answer()`
  - Sends ANM to answer the call explicitly

# Some Future Directions

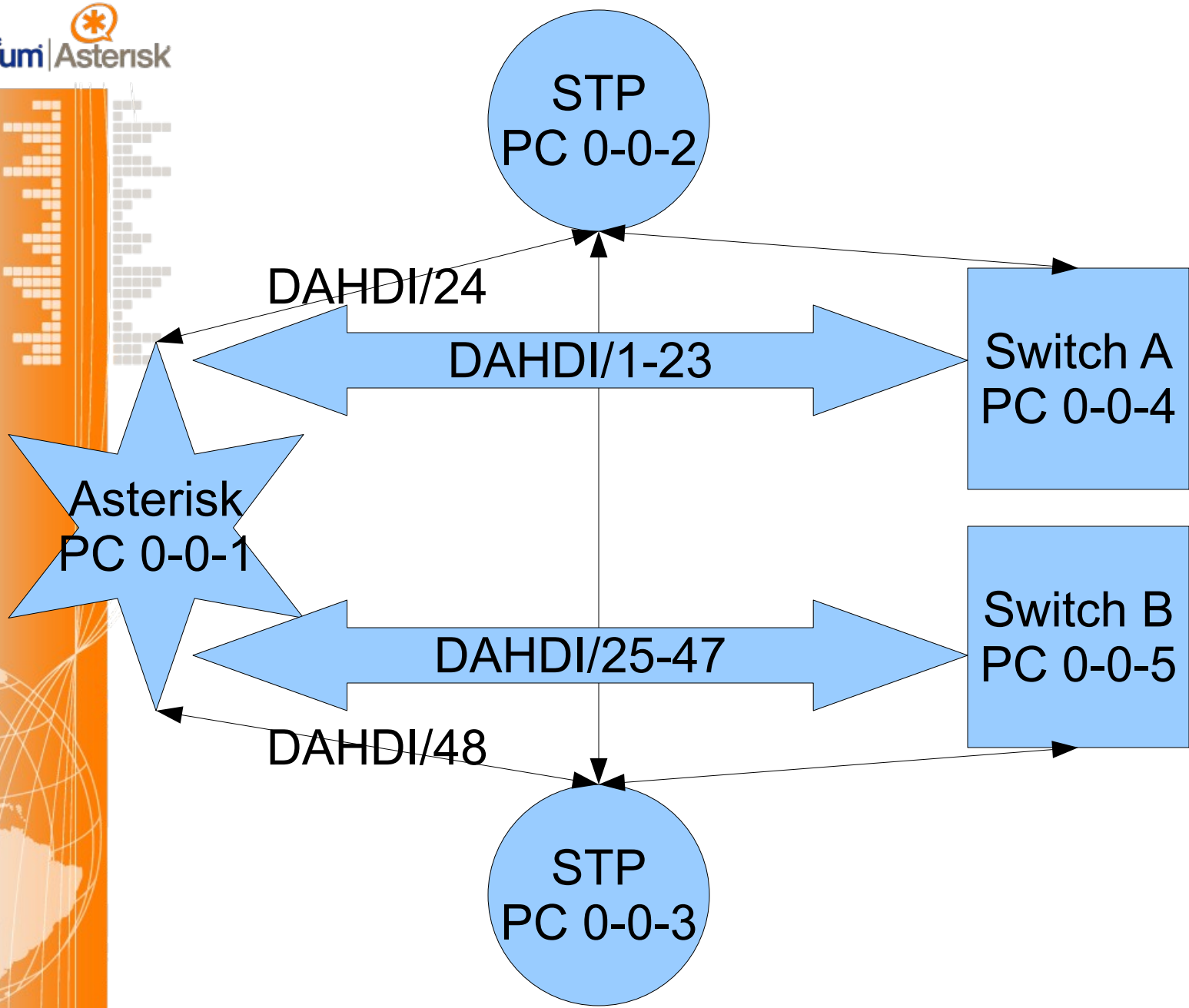
- SCCP/TCAP support – DB lookups
- Separation of signalling and bearer machines
- MAP support – SMS + mobile phone center integration
- Scalability and Clustering support

# Example Configuration



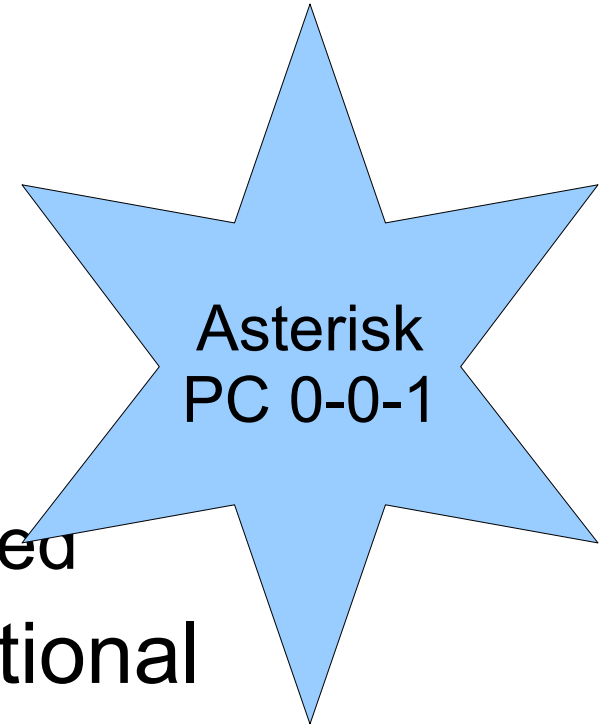
# /etc/dahdi/system.conf

- span=1,1,0,d4,ami
- span=1,2,0,d4,ami
  - Setup spans as normally done
- bchan=1-23,25-47
  - Bearers should be bchan
- mtp2=24,48
  - Signalling channels' best option is mtp2.  
Can be dchan or hardhdlc as well.
- 56k=24,48
  - Set the signalling channels to use 56K HDLC  
instead of 64K HDLC



# /etc/asterisk/chan\_dahdi.conf

- signalling=ss7
- ss7type=ansi
  - could be itu also
- linkset=1
  - linkset number used
- networkindicator=national
  - Set MTP3 network indicator field to national
- pointcode=0-0-1
  - Our PC



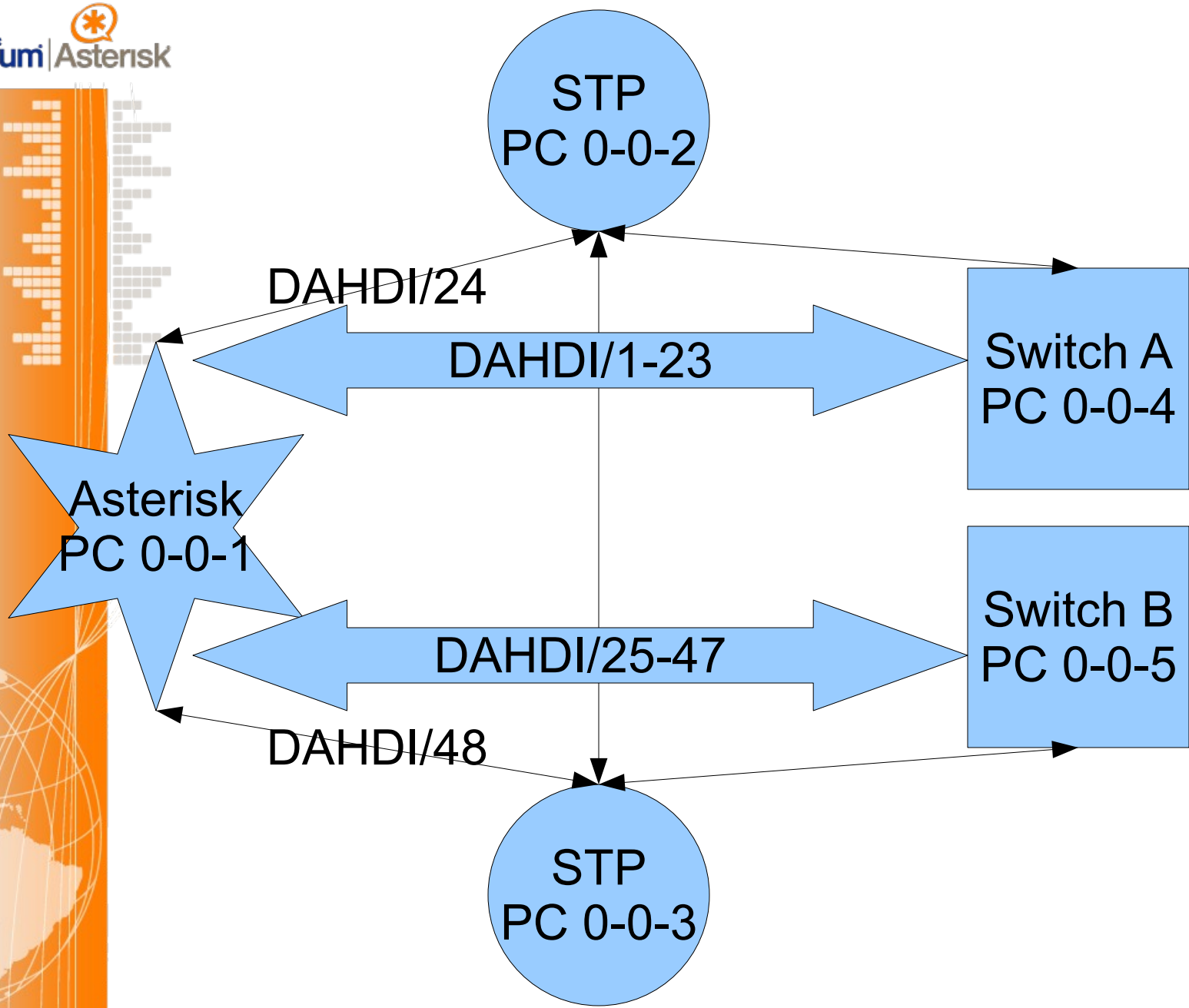


DAHDI/24

STP  
PC 0-0-2

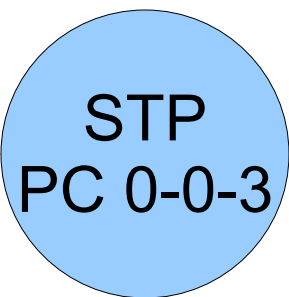
A blue circular icon containing the text "STP" and "PC 0-0-2".

- `adjpointcode=0-0-2`
  - STP's PC (node at other end of link)
- `sigchan=24`
  - Configures DAHDI/24 with above settings

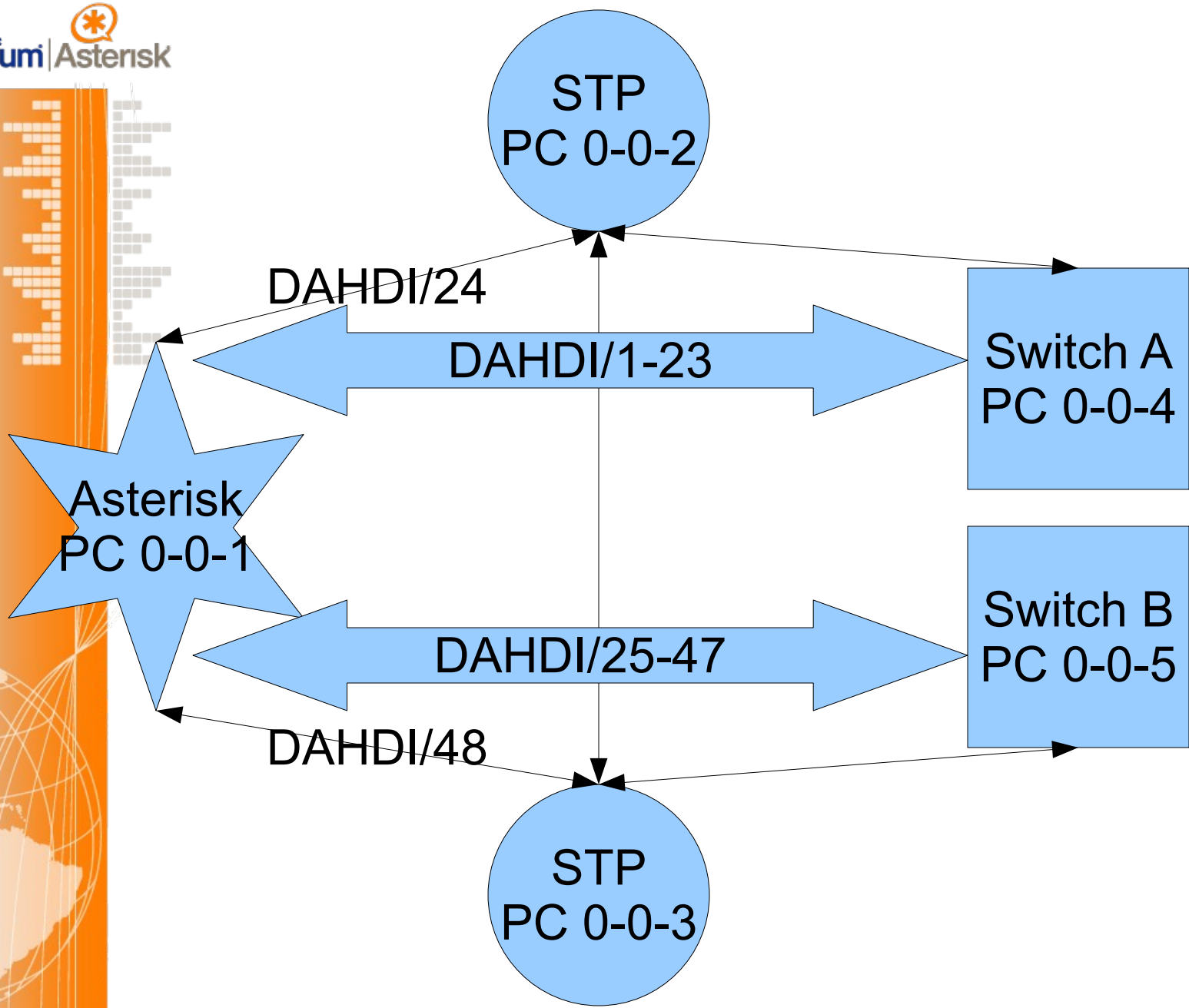




DAHDI/48



- `adjpointcode=0-0-3`
  - STP's PC (node at other end of link)
- `sigchan=48`
  - Configures DAHDI/48 with above settings

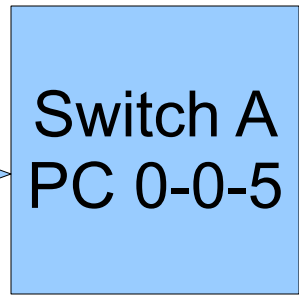


Asterisk  
PC 0-0-1

DAHDI/1-23

Switch A  
PC 0-0-4

- defaultdpc = 0-0-4
  - Sets CICs that follow to send ISUP messages to PC 0-0-4
- cicbeginswith=1
  - This sets the first CIC number to start numbering the next group of channels declared
- channel=1-23
  - Adds DAHDI/1 to DAHDI/23 to linkset 1 and maps them from CIC 1 to CIC 23



- defaultdpc = 0-0-5
  - Sets CICs that follow to send ISUP messages to PC 0-0-5
- cicbeginswith=31
  - This sets the first CIC number to start numbering the next group of channels declared
- channel=25-47
  - Adds DAHDI/1 to DAHDI/23 to linkset 1 and maps them from CIC 31 to CIC 43

# Asterisk/libss7 Resources for Help

- Asterisk-ss7 mailing list ([lists.digium.com](http://lists.digium.com))
- Libss7 README and NEWS files.
- Me
  - AIM: MatthewFredricks
  - Jabber: [creslin@digium.com](mailto:creslin@digium.com)
  - MSN: [creslin287@hotmail.com](mailto:creslin287@hotmail.com)
  - Email: [creslin@digium.com](mailto:creslin@digium.com)