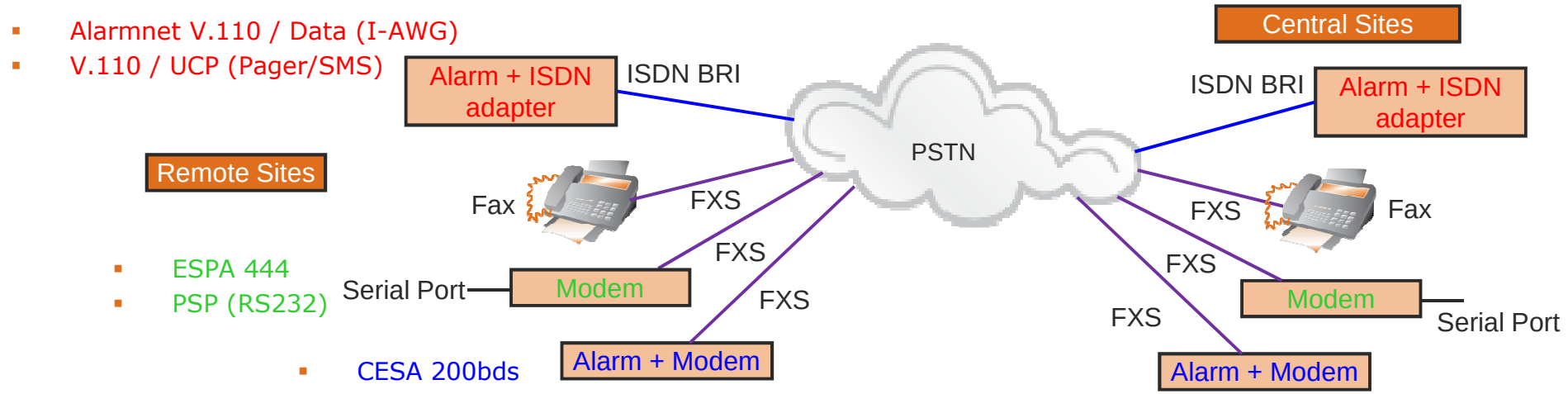
Migration to IP for Alarms

Markus Martinides, Overview December 2016

Existing Alarms

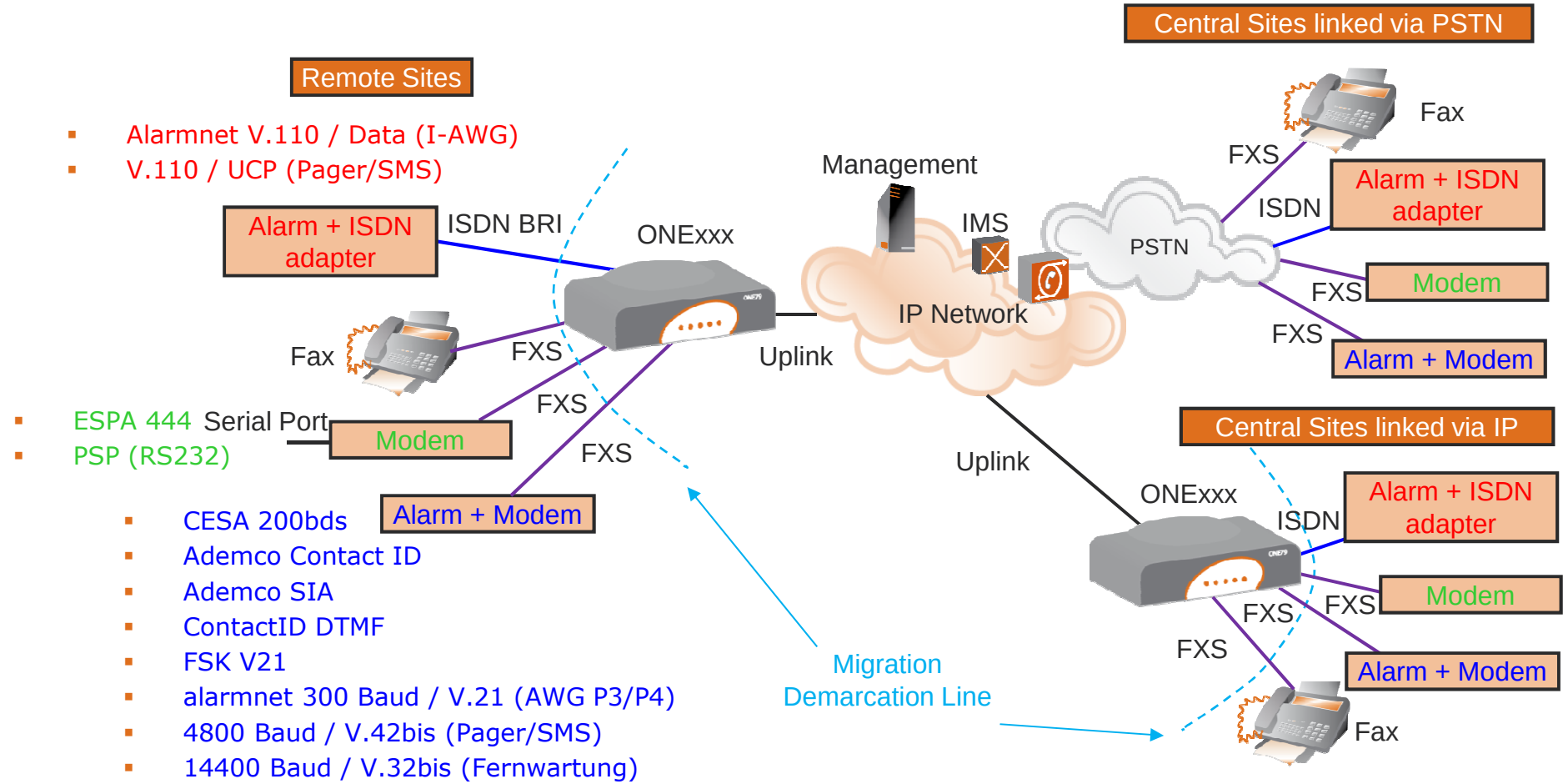
- All protocols are transported transparently over a switched communication
  - ISDN-Basic Rate Interface, or
  - FXS analog phone interface



- Alarmnet V.110 / Data (I-AWG)
- V.110 / UCP (Pager/SMS)
- ESPA 444
- PSP (RS232)
- CESA 200bds
- Ademco Contact ID
- Ademco SIA
- ContactID DTMF
- FSK V21
- alarmnet 300 Baud / V.21 (AWG P3/P4)
- 4800 Baud / V.42bis (Pager/SMS)
- 14400 Baud / V.32bis (Fernwartung)

Migration from Existing Alarms

- All protocols are transported transparently over a IP network via ONExxx with
  - ISDN interfaces, and/or
  - FXS analog phone interfaces



Technical Qualification

- What are the WAN technologies needed ? At which speed ?
  - SHDSL/bis, ADSL/2/+/m, VDSL2, Giga/FastEthernet Point-to-Point Fiber, Giga/FastEthernet UTP
  - 3G, 4G,….
- Are multiple WAN technologies needed ?
  - For backup, for load sharing,…
- How many ports/type per remote site and central site ? Point-to-point only ?
  - Which mix could help to optimize features vs cost ?
- Can the applications support a one-way delay 20-200 ms ?
- What about QoS in new IP networks used ?
  - Can we have Expedited-Forwarding QoS for application flows ?
- What OA clocking solutions would be the most adequate ?
  - 5ppm quartz, DSL-based, SIP RTP synchro,…
- Could all the needed protocols be managed with interfaces below ?
  - ISDN BRI NT
  - FXS dial-up
- Would these interfaces be needed ?
  - Analog Leased Line 2/4wires (300-3400 Hz / 600 Ω / RJ45)
  - I/O (digital 2-pole dry contact RJ45)
  - 1 async RS232 or ? Which connector ?
  - 1 sync RS232 or ? Which connector ?
- Which IMS/Softswitch ?
- Which management, provisioning ?
  - SNMP, TR-069

Comparison ONE vs ATA

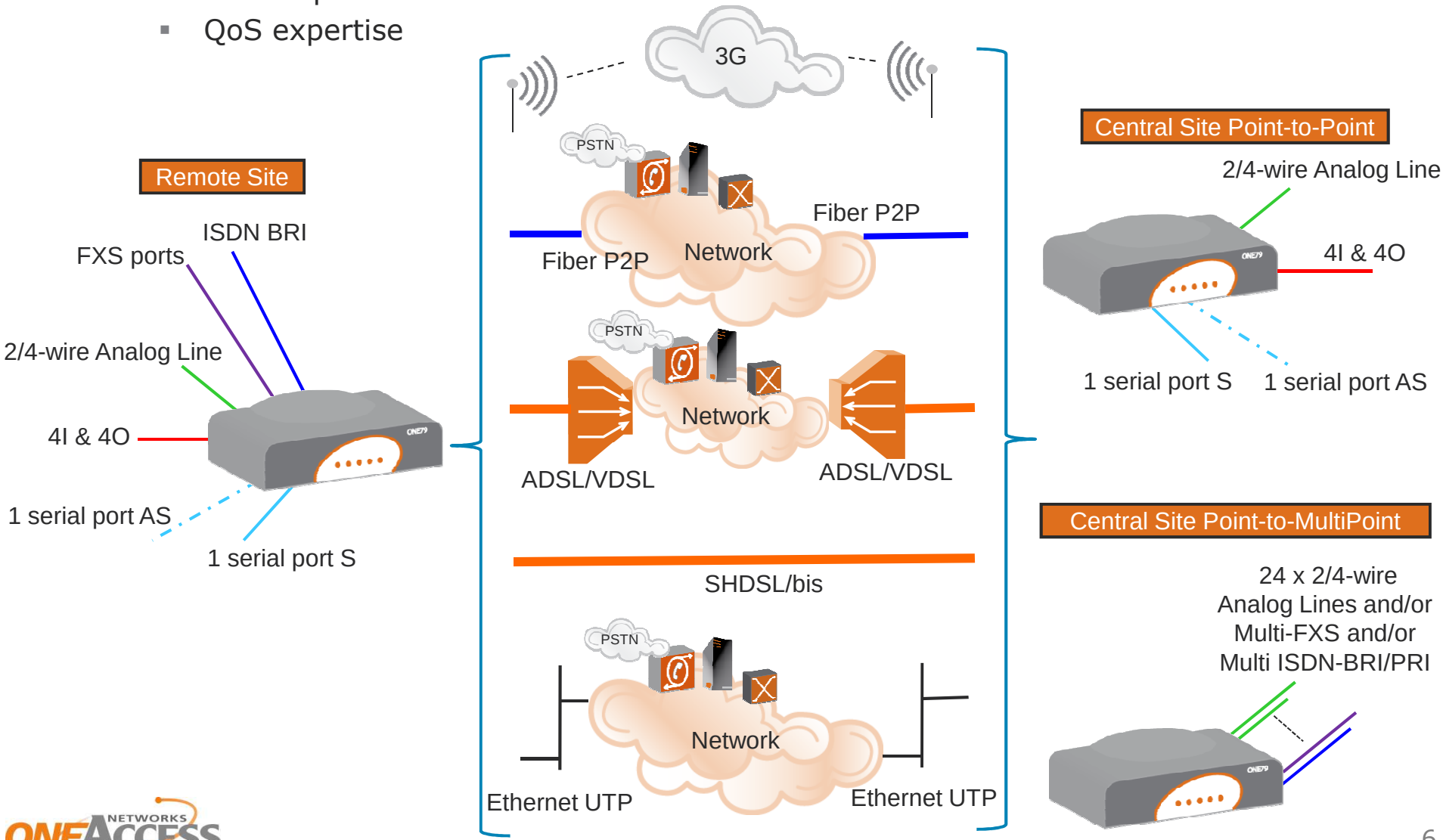
	ONE425-4B-4V AV2 F4TEWn/a	Cisco ATA 190
FXS analog ports for modem, phone or fax	4	2
ISDN-BRI ports (ex: for V.110 alarms)	4	0
LAN ports	Four-port GigaEthernet UTP switch	0
Uplinks	One ADSL2+/VDSL2 port and One FastEthernet UTP/SFP port	One FastEthernet UTP port
64kbit/s UDI transparent transport	Supported	Not supported
T.38 fax relay and Passthrough G.711	Supported	Supported
Enhanced clocking managements (SIP RTP,…)	Supported	Not supported
<5ppm clock generation (for long fax)	Supported	Not supported
Echo cancellation	32ms	8ms ?
Management protocol CWMP	Supported	Not supported

- NB1: Cisco ATA 18x is EOL and replaced with ATA 190
- NB2: In addition to OA model below, other OA models exist with different uplink/user interfaces

Code	Mnemonic	Description
81302 Swiss-Edition	ONE425-4B-4V AV2 F4TEWn/a	ONE425 Fast Ethernet SFP/UTP WAN, single pair A/VDSL2 over POTS, 4BRI (voice service), 4FXS (voice service), 4 port GbE switch, Wifi 11n

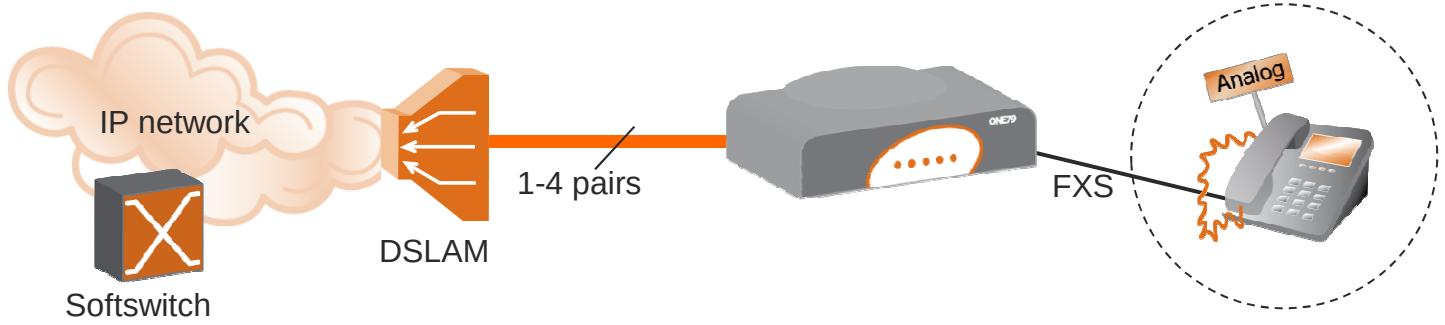
Uplink Mix and User Ports Mix

- OneAccess solutions based on OneOS
  - VoIP expertise
  - QoS expertise



SIP FXS Gateway

- DTMF or Pulse dialing
- Hook Flash (R) detection (Broadsoft compatible)
- Support of CLIP (Caller Id): ETSI/FSK or DTMF
- Configurable tones (dialing, busy, ringback, error)
- Media channel redirection / hold supported
  - Allows support of softswitch services: call transfer, 3-party, music on-hold,..
- Support of # * in dialing phase
  - Enables configuration of services (e.g.: Call Forwarding) directly handled by the softswitch
- FXS compliant with ETSI EN 202 971 V1.2.1



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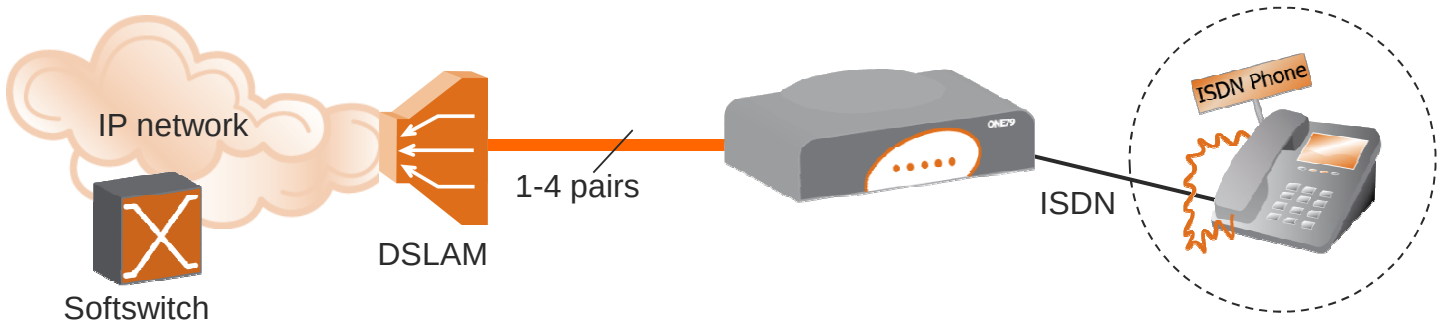
SIP ISDN Gateway

- Reduce operating costs by providing ISDN services over inexpensive technologies
- Migration of ISDN users over SIP VoIP networks
- Signaling: ETSI/Euro-ISDN, Euronumeris, Euronumeris+
- Support of in-band progress indicator
  - ALERT, PROGRESS, RELEASE COMPLETE messages
  - Enables ringback tones or voice messages before or after the call establishment
- Multiple Subscriber Number (MSN) per port, Direct Dial-In (DDI)
- Support of Unrestricted Digital Information (UDI) 64kbit/s

VoIP network sees all ISDN terminals as being native SIP terminals



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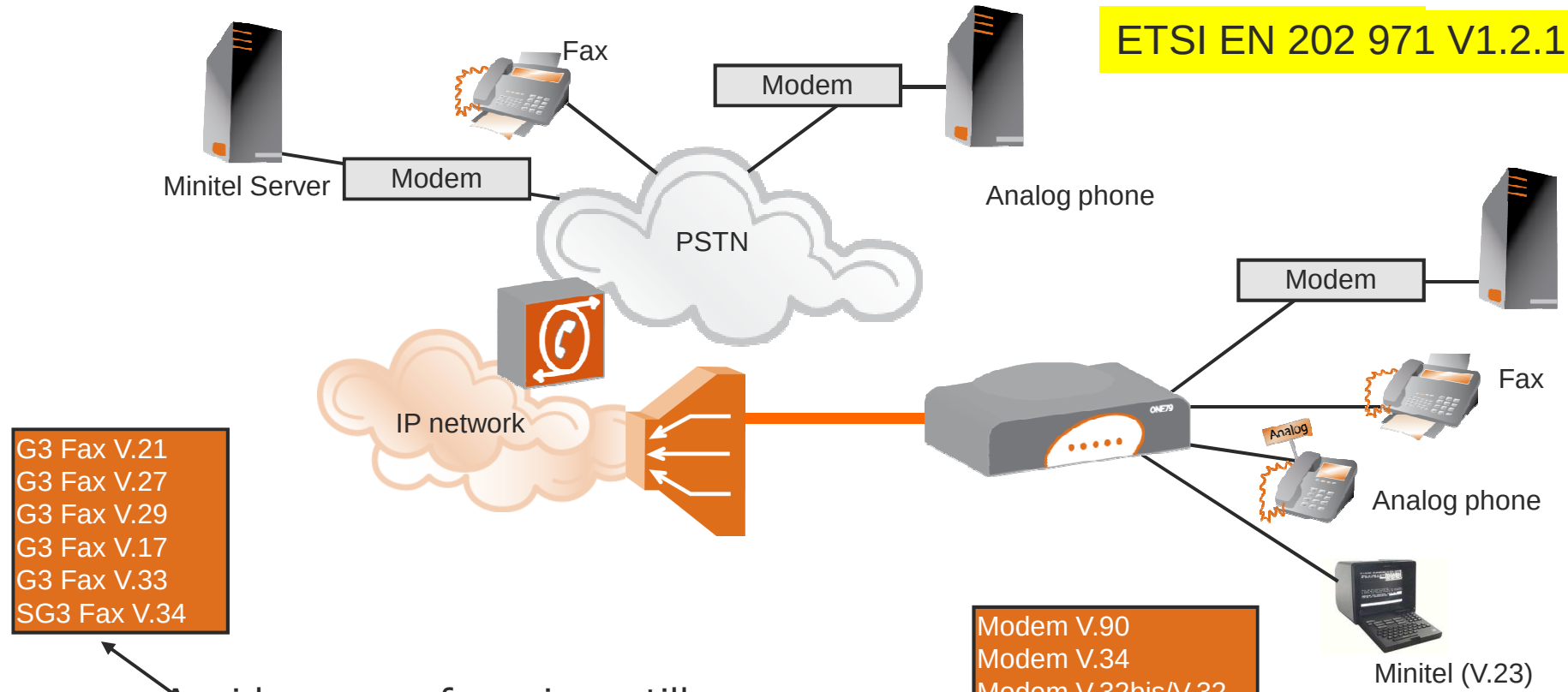
Fax/Modem Support in VoIP



- A wide range of services still uses:
  - Fax
  - Modem ie. Data Protocols
  - Payment terminals (modem)
- Operators and business organizations are moving toward VoIP networks
- OneAccess Solution :
  - Comprehensive support of Fax/Modem over VoIP networks

Features for Modem/Fax Families

CLI configuration	action on CED tone detected (1)	action on ANS or ANSam tone detected (2)

`no echo-disable`
`no modem-passthrough`
`no fax-relay passthrough`
	no action taken	no action taken

`echo-disable voicemodem`
`no modem-passthrough`
`no fax-relay passthrough`
	disable NLP part of echo canceller
	disable DTMF detection
	disable VAD
		disable echo canceller
		disable DTMF detection
		disable VAD

`echo-disable modem`
`no modem-passthrough`
`no fax-relay passthrough`
	disable echo canceller
	disable DTMF detection
	disable VAD
		disable echo canceller
		disable DTMF detection
		disable VAD

`modem-passthrough` `no fax-relay passthrough`	disable echo canceller (3) disable DTMF detection (3) disable VAD (3) switch to G.711 coder (3)	disable echo canceller disable DTMF detection disable VAD switch to G.711 coder
`fax-relay passthrough` `no modem-passthrough`	disable NLP part of echo canceller (4) or disable echo canceller (4) disable DTMF detection disable VAD switch to G.711 coder	no action taken
`fax-relay passthrough` `modem-passthrough`	disable NLP part of echo canceller (4) or disable echo canceller (4) disable DTMF detection disable VAD switch to G.711 coder	disable echo canceller disable DTMF detection disable VAD switch to G.711 coder

(1): CED tone is used by Group 3 (G3) faxes and low speed modems up to V.29 modulation (9600 bps). G3 fax detection is done according to `detection-fax` configuration (V.21 or CED).

(2): ANS or ANSam tone is used by Super Group 3 (SG3) faxes and high speed modems (from V.32 modulation and above)

(3): in that case G3 faxes are considered as low speed modems

(4): according to `echo-disable` configuration

VAD : Voice Activity Detection
NLP : Non Linear Processing

SWISS Analog Interface Technical

Telefonanschluss-Kenndaten

Gleichstromschlaufe

Speisespannung:	48 V (Pluspol an Erde)
U_{App} bei aufgelegtem Mikrotel:	48 V
U_{App} bei abgehobenem Mikrotel:	4 .. 10V
Gleichstrom:	20...50 mA
Schlaufenwiderstand:	960....240 Ohm
Speisedrossel-Widerstand:	2 x 350 Ohm
Endgerätewiderstand:	200 Ohm
Tn-Leitungswiderstand:	60 ..1500 Ohm

Wechselstromschlaufe

Sprechwechselspannung:	0,2...0,3 V (max. 0,8 V)
Sprechwechselstrom:	0,3...0,5 mA (max. 1,3 mA)
Übertragungsfrequenz:	300....3400 Hz
Schlaufenimpedanz:	600 Ohm bei 800 Hz

Rufsignal

Rufspannung:	70 V ~, überlagert auf die Gleichspannung
am Endgerät:	15...70 V ~ je nach Leitungslänge
Rufstrom:	20...28 mA
Ruffrequenz:	25 Hz bei Amtszentraten 50 Hz bei TVA's
Rufrhythmus:	1 s Ruf 4 s Pause

Summton

Empfangsspannung:	0,38 V (-6dB)
Strom:	0,63 mA
Frequenz:	425 Hz bei Amtszentralen 500 Hz bei TVA's

Besetztton

Wie Summton

Rhythmus:	1/4s Ruf / 1/4s Pause

Taximpulse

Empfangsspannung.	0,1...2 V
Impulsstrom:	0,5...10 mA
Frequenz:	12kHz ± 1 %
Impulsdauer:	50...70 ms

Compatibility Chart

Requirements	One425
Gleichstromschlaufe **DC Loop**	Yes
Wechselstromschlaufe **AC Loop**	Yes
Rufsignal **Ringing**	Yes Ringing Pattern configurable
Summton **Dialtone**	Yes Dialtone Pattern configurable
Besetztton **Buzytone**	Yes BusyTone configurable
TaxImpulse	Yes configurable

Fax/Modem Transmission

- T.38 Fax Relay (G3 Fax)
  - Fax Relay applies to Fax G3 transmissions
  - The fax signal is demodulated by the calling gateway
    - to extract the T.30 content
    - to encapsulate it into Internet Fax Packets (IFP).
  - At the remote end the called gateway
    - extract the T.30 content from the IP packets
    - re-generates the analog fax modulation signal
- Fax/Modem Pass through
  - The fax/modem signal is passed in-band through the VoIP network using G.711 coding
- Jitter Buffer to deal with the variations in delay and jitter
  - clock sensitive applications such as fax and modem
  - a jitter buffer is implemented in the IAD at the receiver side
    - Default value: 100 ms
  - directly managed in DSP for accurate real-time processing

Fallback from SG3 fax to G3 fax

Fallback from T.38 to Pass-through

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G3 Fax ECM & Redundancy

- Error Correction Mode (ECM)
  - applies to G3 fax
  - allows fax machines to detect fax transmission errors
  - retransmits erroneous frames
- ECM feature over T.38
  - can be turned on and off
  - disabling the ECM feature overrides the fax device capability
- T.38 redundancy with different levels (from 0 to 4)
  - defines the number of times T.38 UDP packets are repeated.
  - OneAccess recommends to use T.38 redundancy over unreliable networks with packet loss and a lot of jitter

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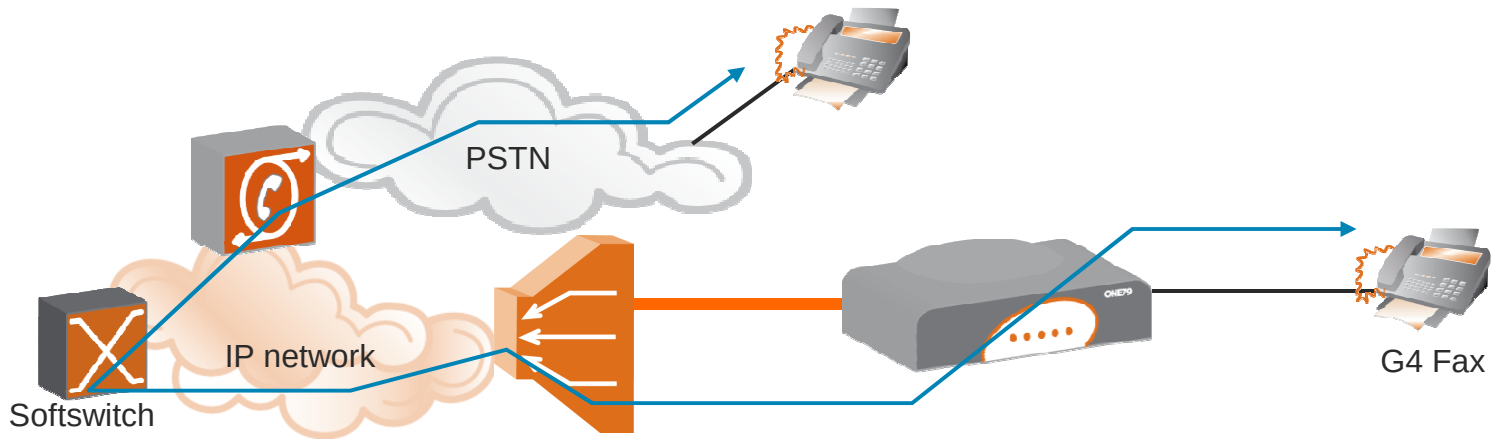
ISDN Fax Transmission

- G4 fax machines
  - designed for use with ISDN networks
  - Unrestricted Digital Information (UDI) 64kbit/s channels
- The calling gateway offers the Clear Mode pseudo-codec for session establishment (SIP-SDP)
- Fax data are carried transparently
  - RTP packets
  - No encoding/decoding



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Thank you

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