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T1 Voice Signaling Bits

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Q&A

T1 Voice Signaling Bits

Q: T1 Voice Signaling Bits

A:

Introduction

Signaling bits are used to indicate the progress of a voice call on a T1 circuit (Off-hook, On-hook, Ringing, Disconnect, etc...) These apply if you are using ADTRAN FXS/FXO/E&M voice modules. This note will explain the states of the signaling bits.

Signaling Bit Charts

FXS LOOP-START MODE

(Receiving a call into FXS 2W interface)

	System Status	RXA	RXB	TXA	TXB	Comments
1	Idle	0	1	0	1	Loop open; No ringing
2	Ringing	0	0/1	0	1	Ringing cadence follows RXB
3	FXS senses off-hook	0	1	1	1	Ringing tripped, phone is off-hook
4	Connection complet	0	1	1	1	Talking
5A	FXS senses on-hook	0	1	0	1	Disconnection, phone is on-hook

System Status	RXA	RXB	TXA	TXB	Comments
5B Far end disconnect	1	1	1	1	Far end phone hangs up. 500 ms battery removal while receiving 11.
6B Idle	0	1	0	1	Disconnection, phone is on-hook, Idle

FXS LOOP-START MODE

(Originating a call from a FXS 2W interface)

System Status	RXA	RXB	TXA	TXB	Comments
1 Idle	0	1	0	1	Loop open; No ringing
2 FXS goes off-hook	0	1	1	1	Off-hook, drawing dialtone
3 Dial address digits	0	1	1	1	Dial-pulsing or passing DTMF
4 Addressing complete	0	1	1	1	Dialing done, answered and talking
5A FXS senses on-hook	0	1	0	1	Disconnection, phone is on-hook (loop open)
5B Far end disconnect	1	1	1	1	Far end phone hangs up. 500ms battery removal while receiving 11.
6B Idle	0	1	0	1	Disconnection, phone is on-hook, Idle

FXO LOOP START MODE

(Receiving call into FXO 2W interface)

System Status	RXA	RXB	TXA	TXB	Comments
1 Idle	0	1	0	1	Loop open; No ringing
2 Ringing	0	1	0	0/1	TXB follows ringing cadence
3 FXO goes off-hook	1	1	0	0	Ringing tripped, FXO is off-hook
4 Connection complete	1	1	0	1	Talking
5A Far end disconnect	0	1	0	1	Far end phone hangs up.
6A FXO goes on-hook	0	1	0	1	Disconnection, phone on-hook, idle
5B FXO goes on-hook	1	1	1	1	Send "far end disconnect" signal
6B On-hook	0	1	0	1	Idle

FXO LOOP START MODE

(Originating call out of 2W interface)

System Status		RXA	RXB	TXA	TXB	Comments
1	Idle	0	1	0	1	Loop open; No ringing
2	FXO goes off-hook	1	1	0	1	Off-hook, drawing dialtone
3	Dial address digits	1	1	0	1	Dial-pulsing or passing DTMF
4	Addressing complete	1	1	0	1	Dialing done, answered and talking, connected
5A	Far end disconnect	0	1	0	1	Far end phone hangs up.
6A	FXO goes on-hook	0	1	0	1	Disconnection, phone on-hook, idle
5B	FXO goes on-hook	1	1	1	1	Send "far end disconnect" signal
6B	On-hook	0	1	0	1	Idle

FXS TANDEM LOOP START MODE

(Receiving a call into FXS 2W interface, wink start and loop-reverse battery enabled)

System Status		RXA	RXB	TXA	TXB	Battery	Comments
1	Idle	0	0	0	0	Normal	On-hook
2	Incoming call	1	1	0	0	Reversed	On-hook, Battery Polarity Reversed
3	Wink back to network	1	1	1	1	Reversed	Wink to Network (250 ms)
4	Wink done	1	1	0	0	R	Wink is finished
5	Ringing FXS port	1	1	0	0	R	Ringing 2S on 4S off, rings when 0
6	Off hook (near end) Connection established	1	1	1	1	R	Ringing stops, talk path is open
7	On-hook	1	1	0	0	R	Near end hangs up
8A	Disconnect (far end)	0	0	0	0	R	Far end hangs up
9A	Disconnect (far end)	0	0	0	0	Off	Battery off (600 ms)
10A	Idle	0	0	0	0	Normal	Battery normal polarity
7B	Disconnect (far end)	0	0	1	1	R	Far end hangs up
8B	Disconnect (far end)	0	0	0	0	Off	Battery off (600 ms) signaling disconnect to analog equipment
9B	Near end hangs up	0	0	0	0	N	Battery normal polarity
10B	Idle	0	0	0	0	N	On-hook

FXS TANDEM LOOP START MODE

(Originating a call from FXS 2W interface, wink start and loop-reverse battery enabled)

System Status		RXA	RXB	TXA	TXB	Battery	Comments
1	Idle	0	0	0	0	Normal	on-hook
2	Off-hook	0	0	1	1	N	loop closed
3	Off-hook, start wink	1	1	1	1	Reversed	wink back from network (140-290ms)
4	Off-hook finish wink	0	0	1	1	N	dial-tone
5	Dial pulsing	0	0	1	1	N	send address info DTMF or dial pulse
6	Off hook addressing done	0	0	1	1	N	far end ringback
7	Off-hook, far end answer, Connection established	1	1	1	1	R	far end answers, talk path is open
8A	On-hook	1	1	0	0	R	near end hangs up
9A	Disconnect (far end)	0	0	0	0	R	far end hangs up
10A	Disconnect (far end)	0	0	0	0	Off	Battery off (600 ms)
11A	Idle	0	0	0	0	N	On-hook
8B	Disconnect (far end)	0	0	1	1	R	Far end hangs up
9B	Disconnect (far end)	0	0	0	0	Off	Battery off (600 ms) signaling disconnect to analog equipment
10B	Near end hangs up	0	0	0	0	N	
11B	Idle	0	0	0	0	N	On-hook

FXS GROUND-START MODE

(Receiving a call into FXS 2W interface)

System Status		RXA	RXB	TXA	TXB	Tip Ground	Ring Ground	Comments
1	Idle	1	1	0	1	Ungrounded	U	On-hook
2	Tip gnd asserted	0	1	0	1	Grounded	U	Line seized
3	Tip gnd & ringing	0	0	0	1	G	U	RXB follows ringing cadence
4	Tip gnd & not ringing	0	1	0	1	G	U	Line seized, no ringing
5	Off hook (loop closed)	0	1	1	1	G	G	Loop closed, connection established

System Status	RXA	RXB	TXA	TXB	Tip Ground	Ring Ground	Comments
6A Far end (FXO) disconnect	1	1	1	1	U	G	Call disconnecting
7A Idle	1	1	0	1	U	U	Loop open returned to far end
6B Near end (FXS) disconnect	0	1	0	1	G	U	Loop open from far end
7B Idle	1	1	0	1	U	U	Idle

FXS GROUND-START MODE

(Originating a call from FXS 2W interface)

System Status	RXA	RXB	TXA	TXB	Tip Ground	Ring Ground	Comments
1 Idle	1	1	0	1	Unground	U	Idle condition
2 Ring gnd detected	1	1	0	0	U	G	
3 Tip gnd returned	0	1	0	0	Ground	G	Tip-gnd returned in response to ring-gnd
4 Loop closed	0	1	1	1	G	G	Send loop closure out NI(T1)
5 Dial pulsing	0	1	0/1	1	G	G	Passing address digits or DTMF
6 Connection established	0	1	1	1	G	G	
7A Far end disconnect	1	1	1	1	G	G	No Tip-gnd, call disconnecting
8A Idle	1	1	0	1	U	U	
8B Near end disconnect	0	1	0	1	G	U	No ring-gnd & loop open
7B Idle	1	1	0	1	U	U	No tip-gnd returned from far end

FXS TANDEM GROUND START MODE

(Receiving a call into FXS 2W interface, wink start and loop-reverse battery enabled)

System Status		RXA	RXB	TXA	TXB	Comments
1	Idle	0	X	0	0	Tip open at FXS output
2	Tip ground	1	X	0	0	Incoming call
3	Wink back to network	1	X	1	1	Wink back for 250ms
4	Wink done	1	X	0	0	
5	Ringling FXS port	1	X	0	0	Ringling 2s on 4s off
6	Ring ground or ring tip	1	X	1	1	Off-hook, loop closed
Connection established		1	X	1	1	
7A	On-hook (near end)	1	X	0	0	Near end hangs up
8A	Disconnect (far end)	0	X	0	0	Tip not grounded
9A	Idle	0	X	0	0	Idle, tip open at 2W interface
7B	Disconnect (far end)	0	X	1	1	Far end hangs up
8B	Idle	0	X	0	0	Tip open at 2W interface

FXS TANDEM GROUND START MODE

(Originating a call from FXS 2W interface, wink start)

System Status		RXA	RXB	TXA	TXB	Comments
1	Idle	0	X	0	0	Tip open at 2W output
2	Ring ground, GS seized	0	X	1	1	2W seized
3	Start wink	1	X	1	1	Tip grounded, Wink back from network (140-290 ms)
4	Finish wink	0	X	1	1	Loop closed/off-hook, dial tone
5	Dial pulsing	0	X	0/1	0/1	Send address info DTMF or dial pulse
6	Off hook (near end)	0	X	1	1	Addressing finished, far end ringing
7	Off hook (far end)	1	X	1	1	Far end answers
Connection established						
8A	On-hook (near end)	1	X	0	0	Near end hangs up
9A	Disconnect (far end)	0	X	0	0	Tip open at 2W interface
10A	Idle	0	X	0	0	Tip open at 2W interface
8B	Disconnect (far end)	0	X	1	1	Far end hangs up
9B	Idle	0	X	0	0	Tip open at 2W interface

FXO GROUND START MODE

(Receiving a call into FXO 2W interface)

System Status		RXA	RXB	TXA	TXB	Comments
1	Idle	0	1	1	1	Idle condition
2	Tip gnd detected	0	1	0	1	TXA indicates tip gnd, line seized
3	Tip gnd & ringing	0	1	0	0	TXB follows ringing cadence
4	Tip gnd & not ringing	0	1	0	1	Line seizure, no ringing
5	Off hook (lopp closed)	1	1	0	1	Loop closed, connection established
6A	Near end (FXO) disconnect	1	1	1	1	No tip-gnd, call disconnecting
6B	Idle	0	1	1	1	No ring-gnd & loop open returned from far end
7A	Far end (FXS) disconnect	0	1	0	1	No ring-gnd & loop open from far end
7B	Idle	0	1	1	1	No tip-gnd returned from FXO

FXO GROUND START MODE

(Originating call from FXO 2W interface)

System Status		RXA	RXB	TXA	TXB	Comments
1	Idle	0	1	1	1	Idle condition
2	FXO applies ring-gnd	0	0	1	1	Ring-gnd applied in response
3	FXO detects tip-gnd	0	0	0	1	Tip-gnd returned in response
4	FXO off-hook (loop closed)	1	1	0	1	Loop closure
5	Dial pulsing	0/1	1	0	1	Passing address digits or DT
6	Connection established	1	1	0	1	
7A	Near end (FXO) disconnect	1	1	1	1	No tip-gnd, call disconnecting
8A	Idle	0	1	1	1	
7B	Far end (FXS) disconnect	0	1	0	1	No ring-gnd & loop open from far end
8B	Idle	0	1	1	1	No tip-gnd returned from FXO

DIAL PULSE TERMINATE (DPT)MODE

(Receiving a call into FXO 2W interface)

System Status		RXA	RXB	TXA	TXB	Comments
1	Idle	0	X	0	0	On-hook, normal battery polarity

	System Status	RXA	RXB	TXA	TXB	Comments
2	Off-hook	1	X	0	0	Incoming call
3	Start wink (battery reversal)	1	X	1	1	PBX returns wink to request digits. Battery reversal is detected.
4	End wink (battery normal)	1	X	0	0	End of wink
5	Pulsing digits	1/0	X	0	0	Passing address digits to PBX to complete call
6	Pulsing complete	1	X	0	0	PBX has routed call, ringing station phone
7	Answer, call complete	1	X	1	1	PBX returns answer supervision by reversing battery polarity
8A	Battery normal	1	X	0	0	PBX on-hook first
9A	On-hook, Idle	0	X	0	0	C. O. disconnect, back to idle
8B	On-hook	0	X	1	1	C. O. disconnects first
9B	Battery Normal, Idle	0	X	0	0	PBX on-hook, back to idle

E&M SIGNALING

(Receiving a call into E&M interface, immediate start)

	System Status	RXA	RXB	TXA	TXB	Comments
1	Idle	0	0	0	0	
2	Trunk seized	1	1	0	0	Incoming call
3	Passing digits	0/1	0/1	0	0	Passing DTMF or pulse dialing digits
4	Call	1	1	1	1	Connection complete
5	Far end disconnect	0	0	1	1	Far end hangs up
6	Near end disconnect	0	0	0	0	Idle now

E&M SIGNALING

(Originating a call from E&M interface, immediate start)

	System Status	RXA	RXB	TXA	TXB	Comments
1	Idle	0	0	0	0	
2	Trunk seized	0	0	1	1	Outgoing call
3	Passing digits	0	0	0/1	0/1	Passing DTMF or pulse dialing digits
4	Call	1	1	1	1	Connection complete
5	Far end disconnect	0	0	1	1	Far end hangs up

System Status	RXA	RXB	TXA	TXB	Comments
6 Near end disconnect	0	0	0	0	Idle now

FXS PLAR

System Status	RXA	RXB	TXA	TXB	Comments
1 Idle	1	X	1	1	Idle
2 Off-hook (near end)	1	X	0	0	Ringing far end, 2S on 4S off
3 Off-hook (far end)	0	X	0	0	Connection complete
4A On-hook (far end)	1	X	0	0	No ringing
5A On-hook (near end)	0	X	0	0	Idle
4B On-hook (near end)	0	X	1	1	No ringing
5B On-hook (far end)	1	X	1	1	Idle

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