Understanding Brooktrout Return Codes

Preface

This document is intended for resellers and end users that use LAN Fax applications with the Brooktrout API. It describes return codes that may be logged by the application. For example, in the case of a failed call or fax attempt, the application may log the hangup code returned by the board.

These return codes may not match how the LAN Fax application presents them to you, for example they may prefix the Brooktrout code to distinguish it from internal or other return codes.

When using the return code to determine the nature of a failed fax, be aware that codes can be returned for many normal events, such as a busy line or if a receiving fax machine has ran out of paper. It is important to first assess if the problem is consistent, occurs abnormally frequently or can be reproduced before attempting to identify the root cause.

The five phases of faxing

To understand the reason for a failed fax, it is important to determine when the failure occurred. Defined within the T.30 standards are the five phases of a fax call, defined below.

Phase A
Call establishment.
When originating a call, this is the dialling of the destination number, the detection of pickup and an answering fax machine. Final Call Progress (FCP) values are returned to the application after phase A, and are described in the accompanying table.

Phase B
Pre-message procedure
Consists of the identification of capabilities and the commanding of the chosen conditions, as well as the confirmation of acceptable conditions. Essentially it is when the sending and receiving devices exchange control information to determine many parameters, including what compression (MH, MR, MMR), speed (9.6k, 14.4k) and resolution (Normal, Fine, Ultrafine) will take place.

Phase C
Message transmission
The actual transfer of the fax image takes place here.

Phase D
Post-message procedure
This includes information regarding end-of-message, confirmation, end-of-facsimile signalling.

Phase E
Call release
The hangup of the call.

Types of Return Code

There are three types of code returned by the Brooktrout API. These will be covered later in detail.

Final Call Progress
At the end of phase A, the API returns a Final Call Progress to the application, this includes such things a *busy*, or *ringing with no answer.*

Fax Hangup Code
The API returns a fax hangup code for termination occurring anywhere during phases B-D. There is a very wide range of hangup codes.

Hardware/firmware Error codes
These could be returned at any time, representing an abnormal fatal error.

Final Call Progress

Since this value is returned at the end of phase A, and no fax information transfer has taken place, any issues are telephony and not fax related. These would be logged in cases such as, failure to dial out from behind a PBX, invalid numbers, no connection/open circuit cables or invalid/incorrect country code selection.

Value	Call Progress Type	Description
301	BUSY1	Normal busy; remote end busy (off-hook)
302	BUSY2	Normal busy; remote end busy (off-hook). Used instead of BUSY1 in certain countries.
303	ROBUSY	Reorder or fast busy; indicates that telephone company trunk lines are busy; on PBXs, indicates no available outside lines.
304	RECALL	Recall dial tone detected; signal generated when calling another party while already connected to one or more parties (for example, conference calling, call waiting).
305	CONFIRM	Confirmation tone; automated equipment acknowledges successful completion of caller requested feature (for example, call forwarding). This is not G2 confirmation tone (CFR2).
308	RING1	Ringback detected; remote end is ringing. The Central Office connected to the dialled number generates this signal.
309	RING2	Ringback detected; remote end is ringing. The Central Office connected to the dialed number generates this signal. Also known as double-ring, it is used in the U.K.
316	HUMAN	Answer (probable human) detected; does not match any other expected call progress signal patterns.
318	DIALTON	Dial tone detected; usually indicates the dialing sequence did not break dial tone.
325	RNGNOANS	Indicates the remote end was ringing but did not answer. In fax mode, this result occurs after the ced_timeout (default: 40 secs) has expired and the line continues to ring (You can adjust the value of these timeout parameters in the btcall.cfg configuration file).
326	G2DETCT	Group 2 fax machine detected; remote machine is capable of sending and receiving G2 facsimiles only.
327	SITINTC	Intercept tone detected; remote end originating failure; invalid telephone number or class of service restriction. With the ISDN TR114, this can also indicate a datalink mis-match (ptp or pmp).
328	QUIET	After dialing the number, no energy detected on the line for the wait_for_ced timeout period; possible dead line.
329	SITVACODE	Vacant tone detected; remote originating failure; invalid telephone number.
330	SITREORD	Reorder tone detected; end office (PBX) or carrier originating failure.
331	SITNOCIR	No circuit detected; end office or carrier originating failure, possible dead line.
333	RMTOFFHK	Remote fax machine went off-hook (also known as Answer Supervision). On TR114 digital boards only, it is reported when the TR114 detects that the A signaling bit has gone active (logic 1). It is also reported for the TR114 Japanese board with Polarity Reversal Detection when the reverse side answers the call. Since the TR114 does not support other signaling types, this result is valid only when using E&M signaling on T1 lines. On connections not completely digital, the nearest CO in the linkage causes this result. Note: depending on the configuration of the CO, T1 and E1 connections may not use or provide in-band signalling.
348	ISDN_CALL_PROGRESS	By enabling call progress on an ISDN D channel, one of the following values will be in the second byte of the FIFO buffer: 4: CALL_PROCEEDING: Call is proceeding normally. 5: CALL_ALERTING: Ringback detected; remote end is ringing 6: CALL_CONNECTED: Call is connected 7: CALL_DISCONNECTED: Call was disconnected
349	ISDN_CALL_COLLISION	Indicates that a call collision occurred on the ISDN line.

Final call progress values when in fax protocol mode

Fax Hangup Codes

These are first divided into whether the fax was being originated, or answering. They are further grouped into which of the T.30 phases the hangup occurred. The codes and a brief description of that code are listed below.

From the hangup code, it is possible to identify during which phase the hangup occurred, whether the board was originating or answering, and obtain a description. To further identify exactly the cause of the hangup would require a detailed knowledge of the T.30 protocol. The T.30 flowchart for non-ECM transmission is provided for reference.

Page column

This field generally shows the page number of the Annex to refer, to find the location within the T.30 protocol that the hangup occurred. The sections shown on pages A-5 and A-6 *Response Received ?* and *Command Received ?*, are called from a variety of locations within the T.30 protocol, and you will also need to determine from where the *Response Received ?* or *Command Received ?* was called.

For example, hangup code 29 (DCN received in COMREC) refers to page A-6. The number 29 can be seen next to exit point 4, as its description indicates, this was a disconnection received during the *Command Receive* state, although we cannot tell where the *Command Receive* was called from. From the table below, code 29 belongs to the group of Transmit Phase B Codes, transmit phase B is shown on page A-1, and the particular point that the *Command Receive* was called can be seen, shown as COMMAND REC?

FCP as a page value indicates that this is a Final Call Progress, or Phase A disconnection.
ECM as a page value indicates that this is a ECM mode hangup code, not shown in the flowchart.

Value	Page	Hangup code	Description
Call Placement Phase A Codes			
0	FCP	HNG_NORMAL_XMIT	Normal and proper end of connection.
1	FCP	HNG_RNG_DET	Ring detected without a successful handshake.
2	FCP	HNG_ABORT	Call Aborted
3	FCP	HNG_NO_LOOP_CURRENT	No loop current or A/B signaling bits.
4	FCP	HNG_ISDN_DISCONNECT	ISDN disconnection.
11	A-1	HNG_T1_TIMEOUT	No answer, T.30 T1 time-out.
Transmit Phase B Codes (A-1)			
20	A-1	HNG_XMITB_TIMEOUT	Unspecified transmit Phase B error.
21	A-6	HNG_XMITB_NORM	Remote cannot receive or send.
22	A-1	HNG_XMITB_MISC	COMREC error, Phase B transmit.
23	A-1	HNG_XMITB_COMREC_VCNR	COMREC invalid command received.
24	A-5	HNG_XMITB_SE	RSPREC error
25	A-1	HNG_XMITB_DCS_FTC	DCS send three times without response.
26	A-1	HNG_XMITB_DIS_FTC	DIS/DTC received three times; DCS not recognised.
27	A-1	HNG_XMITB_TRAINFAIL	Failure to train.
28	A-1	HNG_XMITB_RSPREC_VCNR	RSPREC invalid response received.
29	A-6	HNG_XMITB_COMREC_DCN	DCN received in COMREC.
30	A-5	HNG_XMITB_RSPREC_DCN	DCN received in RSPREC.
33	A-1	HNG_PHASEB_INCOMPAT_FMT	Incompatible fax formats, for example, a page width mismatch.
34		HNG_XMITB_INVAL_DMACNT	Invalid DMA count specified for transmitter.
35		HNG_XMITB_FTM_NOECM	Binary File Transfer specified, but ECM not enabled on transmitter.
36	A-1	HNG_XMITB_INCMP_FTM	Binary File Transfer mode specified, but not supported by receiver.

Transmit Phase D Codes (A-3)			
40	ECM	HNG_XMITD_RR_NORES	No response to RR after three tries.
41	ECM	HNG_XMITD_CTC_NORES	No response to CTC, or response was not CTR.
42	ECM	HNG_XMITD_T5TO_RR	T5 time out since receiving first RNR.
43	ECM	HNG_XMITD_NOCONT_NSTMSG	Do not continue with next message after receiving ERR.
44	ECM	HNG_XMITD_ERRRES_EOREOP	ERR response to EOR-EOP or EOR-PRI-EOP.
45		HNG_XMITD_RTN_DCN	Transmitted DCN after receiving RTN.
46	ECM	HNG_XMITD_PPR_EOR	EOR-MPS, EOR-EOM, EOR-NULL, EOR-PRI-MPS, or EOR-PRI-EOM sent after fourth PPR received.
51	A-5	HNG_XMITD_SE	RSPREC error.
52	A-3	HNG_XMITD_MPS_FTC	No response to MPS, repeated three times.
53	A-3	HNG_XMITD_MPS_VCNR	Invalid response to MPS.
54	A-3	HNG_XMITD_EOP_FTC	No response to EOP repeated three times.
55	A-3	HNG_XMITD_EOP_VCNR	Invalid response to EOP.
56	A-3	HNG_XMITD_EOM_FTC	No response to EOM, repeated three times.
57	A-3	HNG_XMITD_EOM_VCNR	Invalid response to EOM.
60	A-5	HNG_XMITD_RSPREC_DCN	DCN received in RSPREC.
61	ECM	HNG_XMITD_PPSNULL_NORES	No response received after third try for PPS-NULL.
62	ECM	HNG_XMITD_PPSMPS_NORES	No response received after third try for PPS-MPS.
63	ECM	HNG_XMITD_PPSEOP_NORES	No response received after third try for PPS-EOP.
64	ECM	HNG_XMITD_PPSEOM_NORES	No response received after third try for PPS-EOM.
65	ECM	HNG_XMITD_EORNULL_NORES	No response received after third try for EOR-NULL.
66	ECM	HNG_XMITD_EORMPS_NORES	No response received after third try for EOR-MPS.
67	ECM	HNG_XMITD_EOREOP_NORES	No response received after third try for EOR-EOP.
68	ECM	HNG_XMITD_EOREOM_NORES	No response received after third try for EOR-EOM.
Receive Phase B Codes (A-2)			
70		HNG_RCVB_TIMEOUT	Unspecified receive Phase B error.
71	A-5	HNG_RCVB_SE	RSPREC error.
72	A-5	HNG_RCVB_MISC	COMREC error.
73	A-2	HNG_T2_PNOTREC	T.30 T2 time-out, expected page not received.
74	A-2	HNG_RCVB_T1_TIMEOUT	T.30 T1 time-out after EOM received.
75	A-6	HNG_NORMAL_RCV	DCN received in COMREC.
76	A-5	HNG_RCVB_RSPREC_DCN	DCN received in RSPREC.
77	A-5	HNG_T2_TIMEOUT	T.30 T2 time-out, expected page received.
78		HNG_RCVB_INVAL_DMACNT	Invalid DMA count specified for receiver.
79		HNG_RCVB_FTM_NOECM	Binary File Transfer specified, but ECM not supported by receiver.
Receive Phase D Codes (A-4)			
101	A-4	HNG_RCVD_SE_VCNR	RSPREC invalid response received.
102	A-4	HNG_RCVD_COMREC_VCNR	COMREC invalid response received.
103	A-4	HNG_RCVD_T3TO_NORESP	T3 time-out; no local response for remote voice interrupt.
104	A-4	HNG_RCVD_T2TO	T2 time-out; no command received after responding RNR.
105	A-6	HNG_RCVD_DCN_COMREC	DCN received for command received.
106	A-6	HNG_RCVD_COMREC_ERR	Command receive error.
107	A-4	HNG_RCVD_BLKCT_ERR	Receive block count error in ECM mode.
108	A-4	HNG_RCVD_PGCT_ERR	Receive page count error in ECM mode.
Miscellaneous Codes			
240		HNG_INTERRUPT_ACK	No interrupt acknowledges, time-out.
241		HNG_COMM_FAULT	Loop current still present while playing reorder tone after time-out.
242		HNG_T30_HOLDUP	T.30 holdup time-out.
243		HNG_HOLDUP_DCN	DCN received from host in receive holdup section for FAX PAD mode.
244		HNG_HOLDUP_DCN_NON_FPAD	DCN received from host in receive holdup section for non-FAX PAD mode.

API-Created Codes – These represent abnormal fatal events			
500		HNG_ERROR_INTERRUPT	An error interrupt occurred, indicating a problem with the board too severe to continue.
501		HNG_INTERRUPT_OVERRUN	The application was unable to process interrupts from the board fast enough, and information was lost.
502		HNG_UNEXPECTED_IRSDONE	The channel generated an unexpected 03 (reset done) or 7F interrupt, indicating the existence of a firmware or hardware problem.
503		HNG_IOCTL_ERROR	An API command to the driver returned an error value, indicating that the driver or the operating system detected an error. This error often occurs when a channel locks up.
505		HNG_MAX_TIMEOUT	

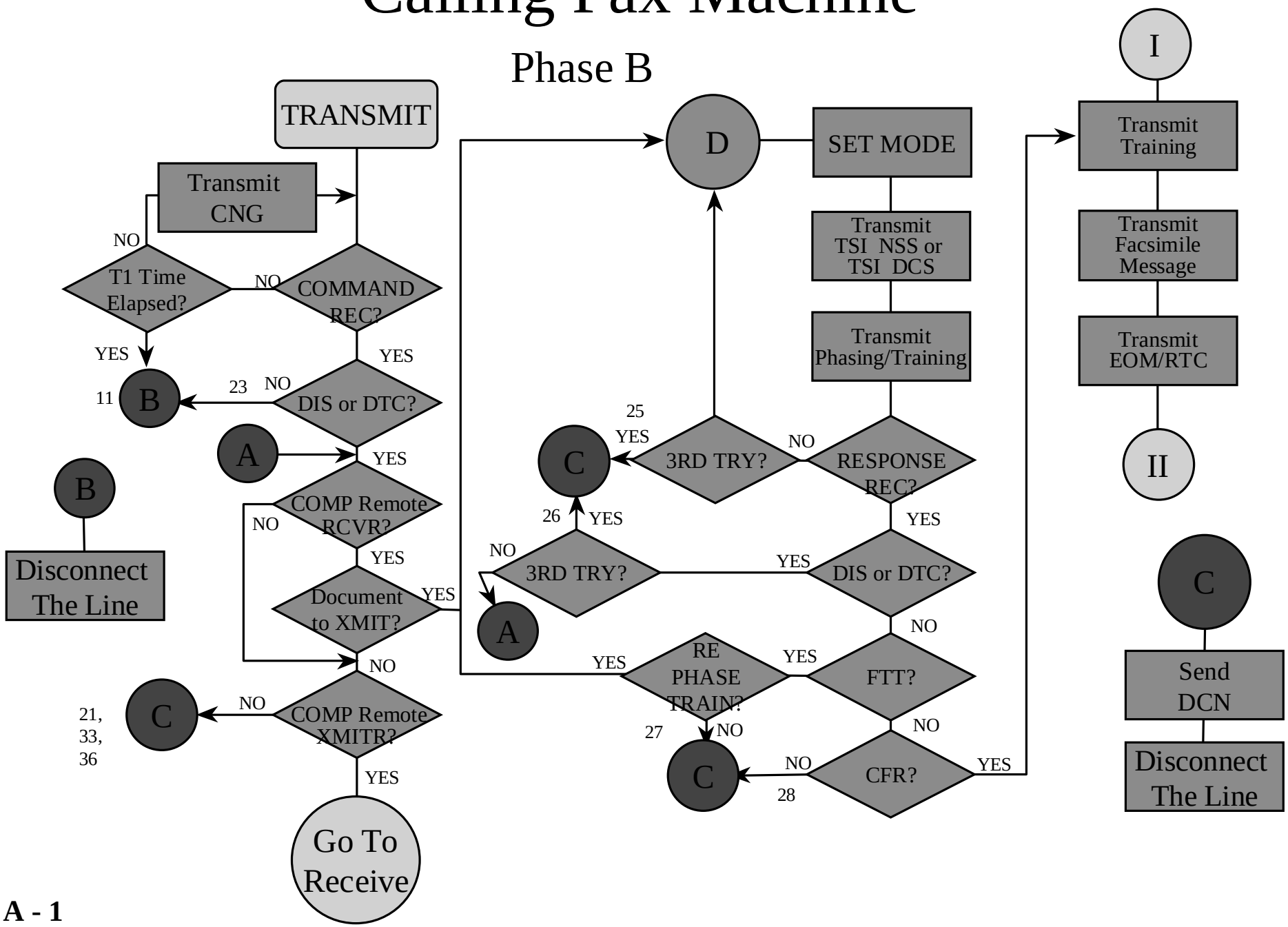
Hardware/firmware Error codes

These occur very rarely, and represent a fatal error within the hardware or firmware. As such they could possibly occur during any phase. Possible errors and their description are included.

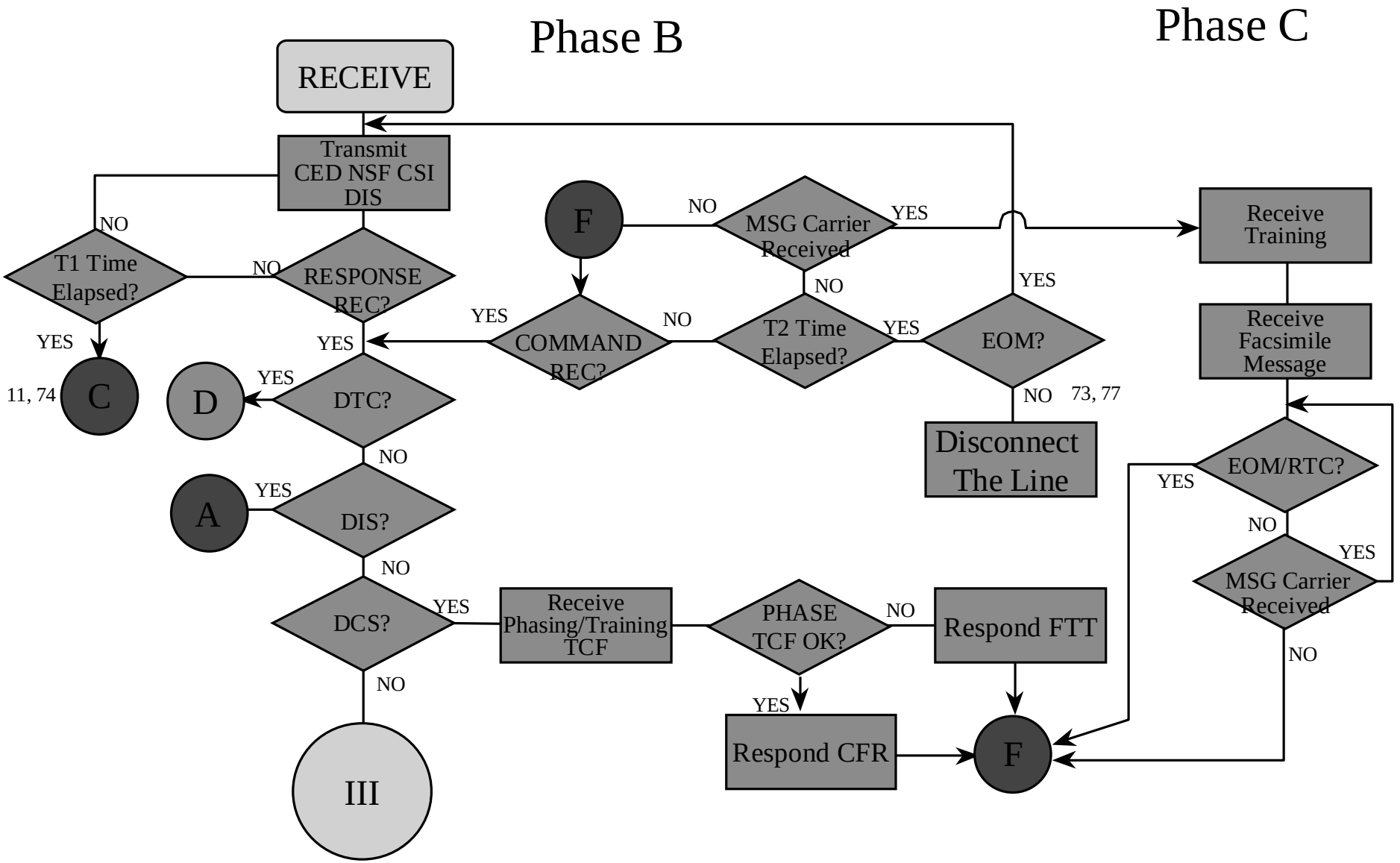
IERROR Value	**Name**	**Description**
IERROR 0x8	DMA grant timeout	Grant Command not issues to channel within 30 secs. Host not keeping up channel stuck/hung.
IERROR 0x5	Transmit buffer underrun	Channel buffer runs empty. Host not keeping up.
IERROR 0x6	Receive buffer underrun	Channel buffer fills up. Host not keeping up.
IERROR 0x4	DMA transfer error	Channel does not receive any/all data. I/O speed too high incompatible DMS.
IERROR 0xFF	Firmware panic interrupt	Firmware in bad / unknown state. Possible bug in firmware.

T.30 Protocol flowchart (non-ECM)

Calling Fax Machine

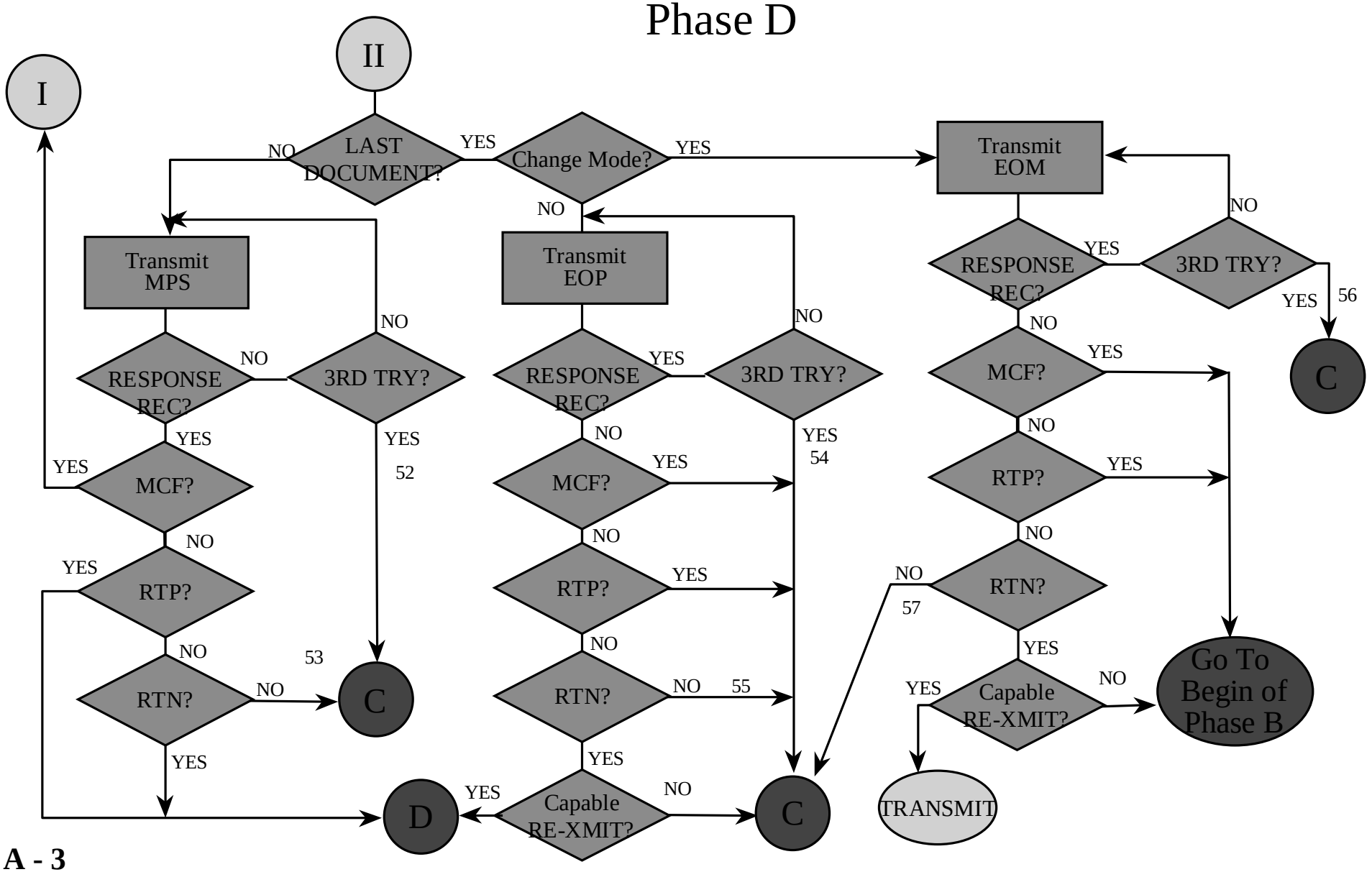


Answering Fax Machine



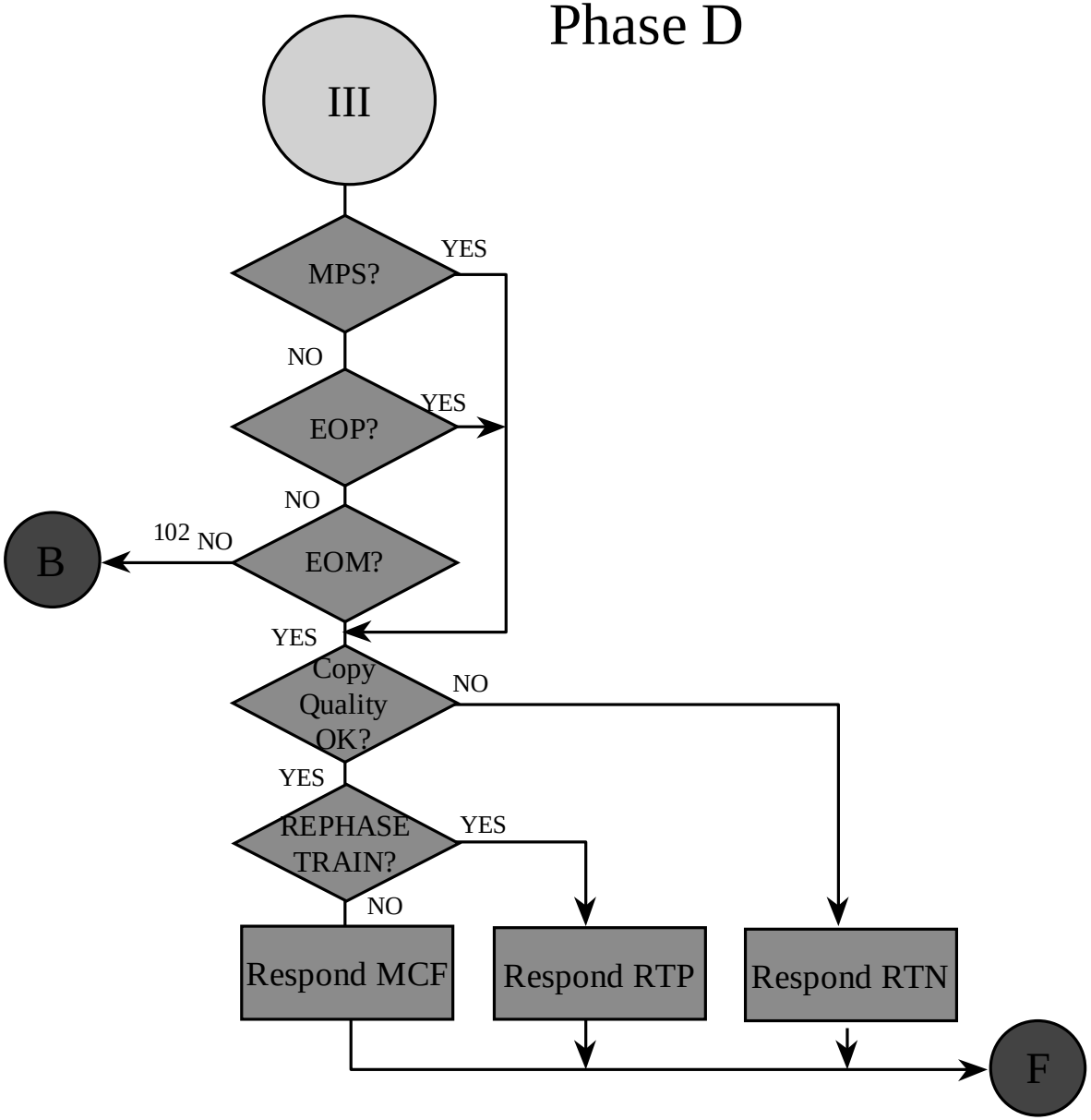
Calling Fax Machine

Phase D

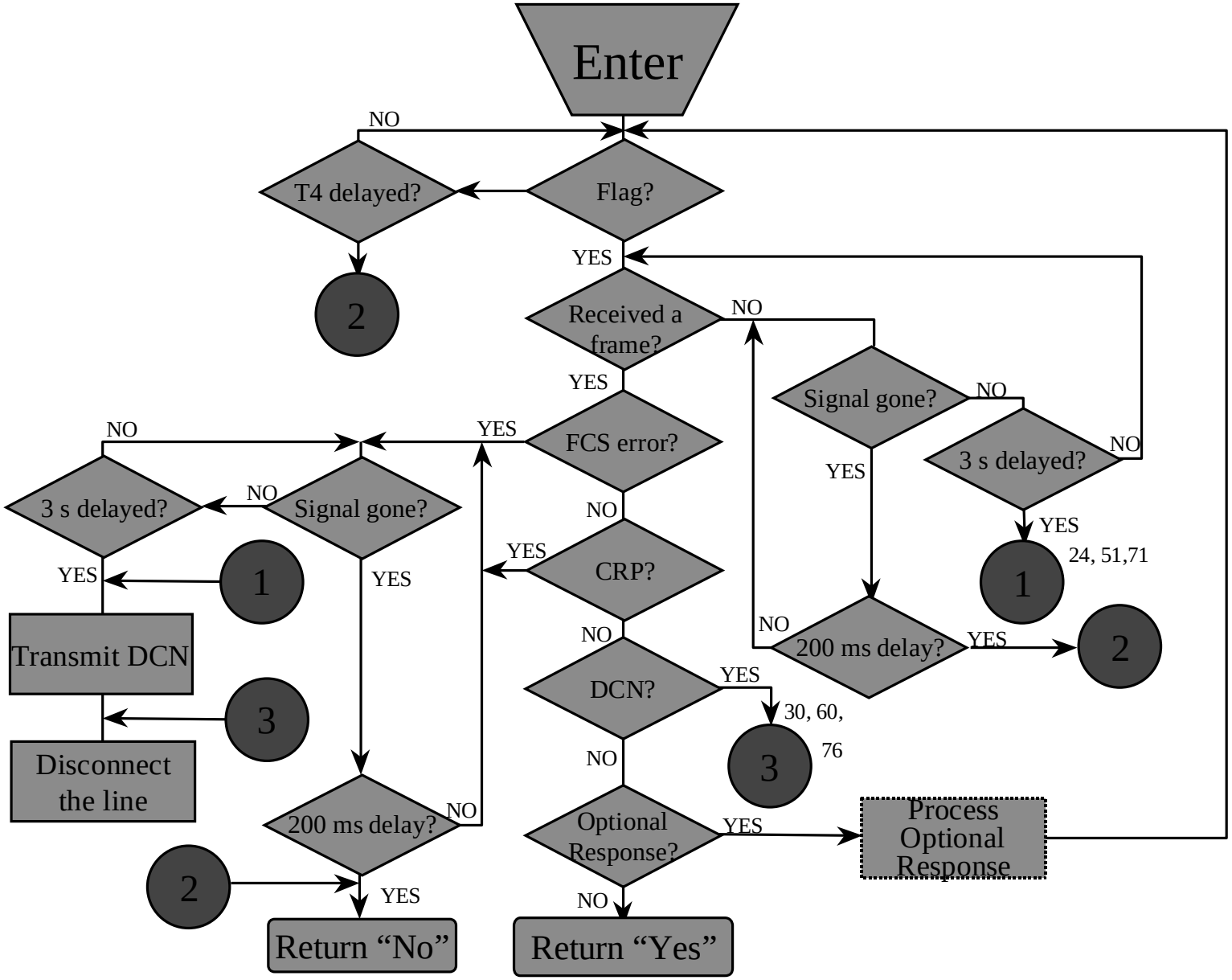


Answering Fax Machine

Phase D



Response Received?



Command Received?