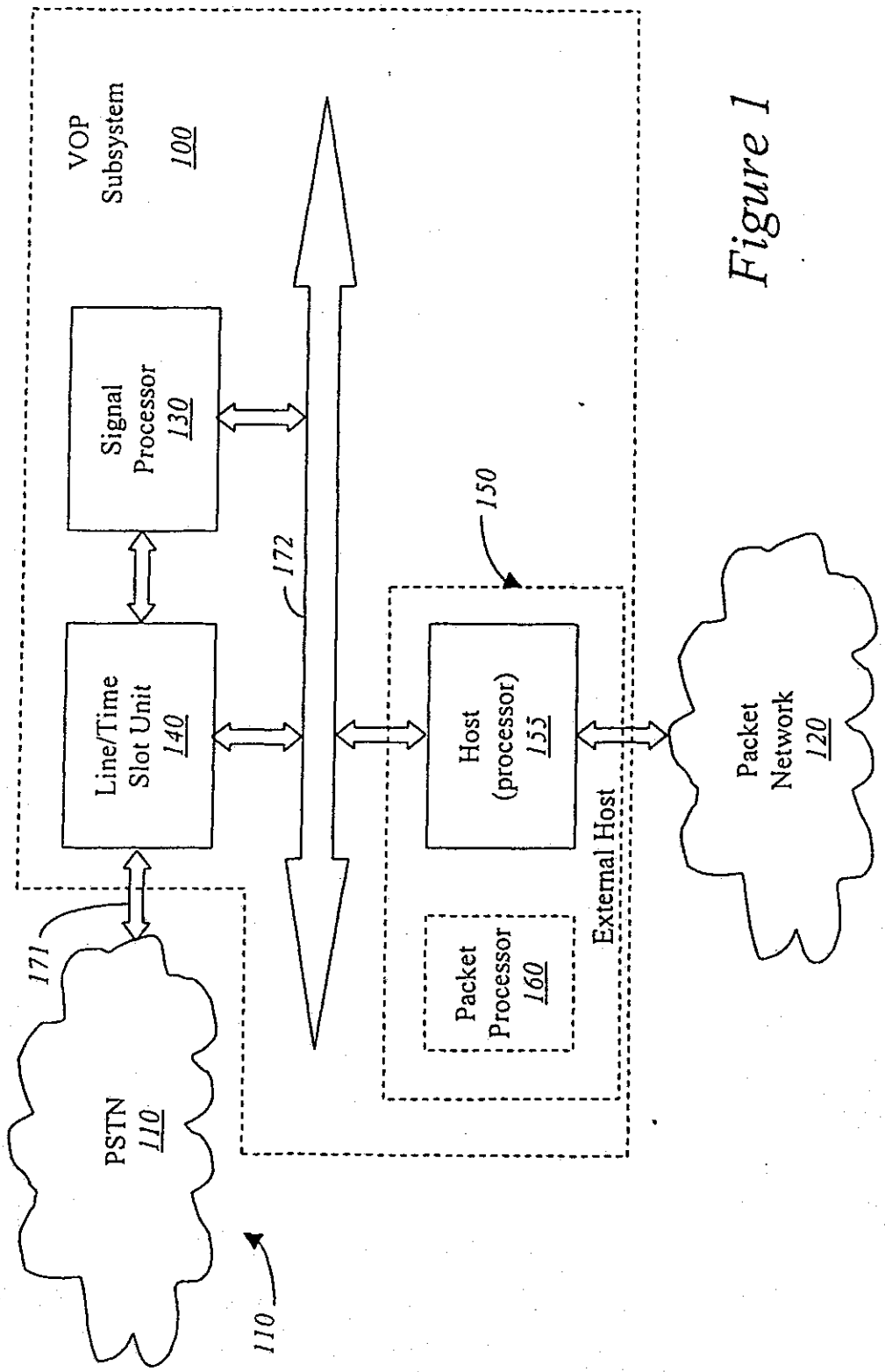

VOP Subsystem 100
Signal Processor 130
Line/Time Slot Unit 140
172
150
Host (processor) 155
Packet Processor 160
External Host
Packet Network 120
PSTN 110
171
110

Figure 1

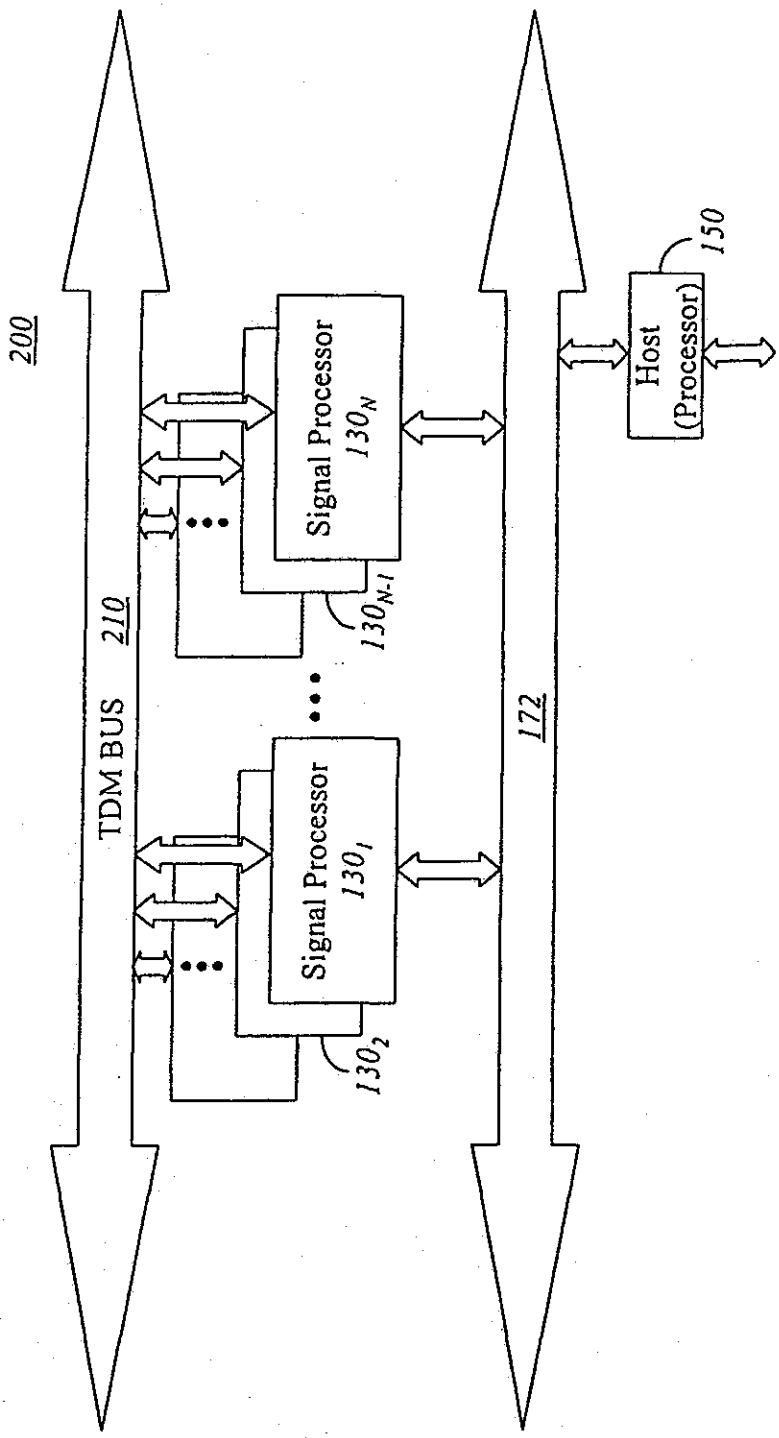

200
TDM BUS
210
Signal Processor
130_N
130_{N-1}
Signal Processor
130_1
130_2
172
Host
(Processor)
150

Figure 2

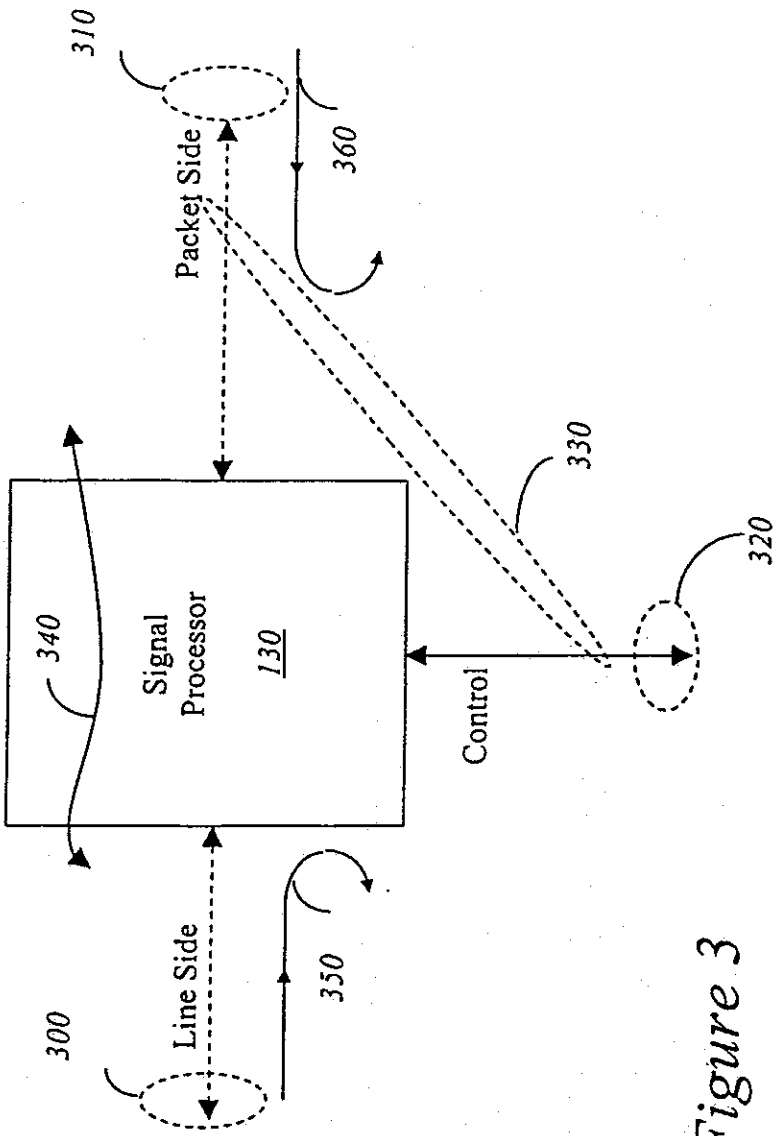

310
Packet Side
360
330
320
340
Signal
Processor
130
Control
350
300
Line Side

Figure 3

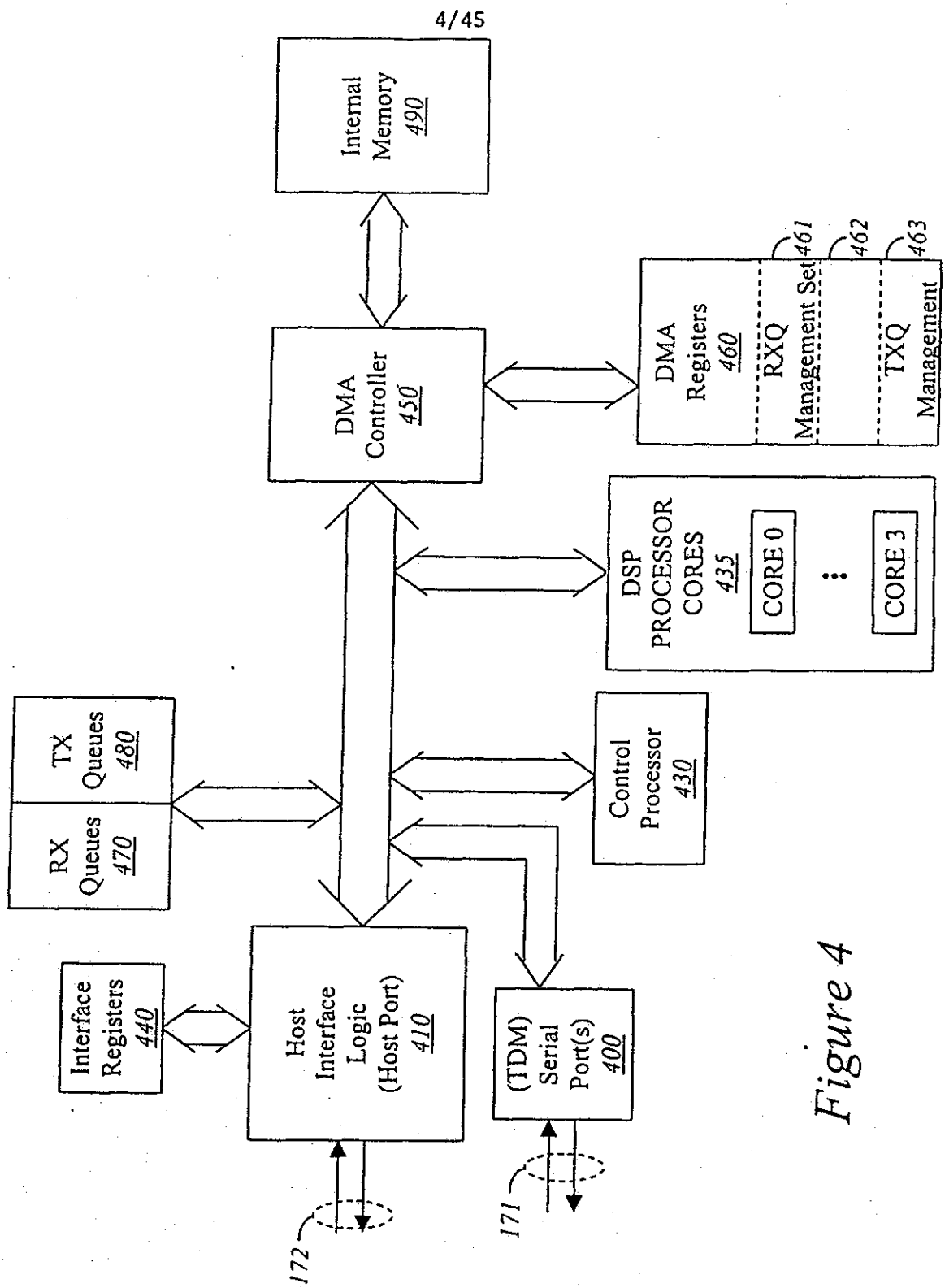
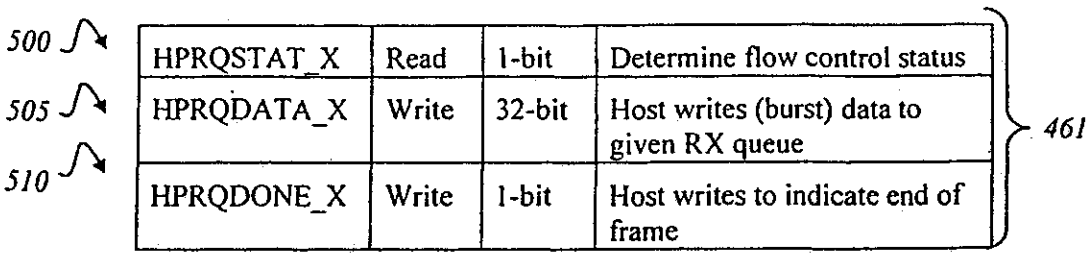
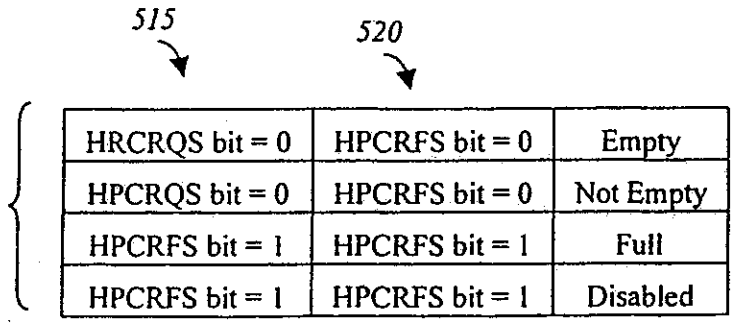

Internal Memory 490
DMA Controller 450
DMA Registers 460
RXQ Management Set 461
462
TXQ Management 463
DSP PROCESSOR CORES 435
CORE 0
CORE 3
TX Queues 480
RX Queues 470
Control Processor 430
Interface Registers 440
Host Interface Logic (Host Port) 410
(TDM) Serial Port(s) 400
172
171

Figure 4



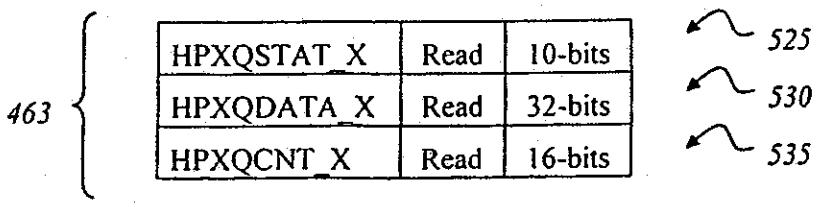
HPRQSTAT_X	Read	1-bit	Determine flow control status
HPRQDATA_X	Write	32-bit	Host writes (burst) data to given RX queue
HPRQDONE_X	Write	1-bit	Host writes to indicate end of frame

Figure 5



HRCRQS bit = 0	HPCRFS bit = 0	Empty
HPCRQS bit = 0	HPCRFS bit = 0	Not Empty
HPCRFS bit = 1	HPCRFS bit = 1	Full
HPCRFS bit = 1	HPCRFS bit = 1	Disabled

Figure 6



HPXQSTAT_X	Read	10-bits
HPXQDATA_X	Read	32-bits
HPXQCNT_X	Read	16-bits

Figure 7

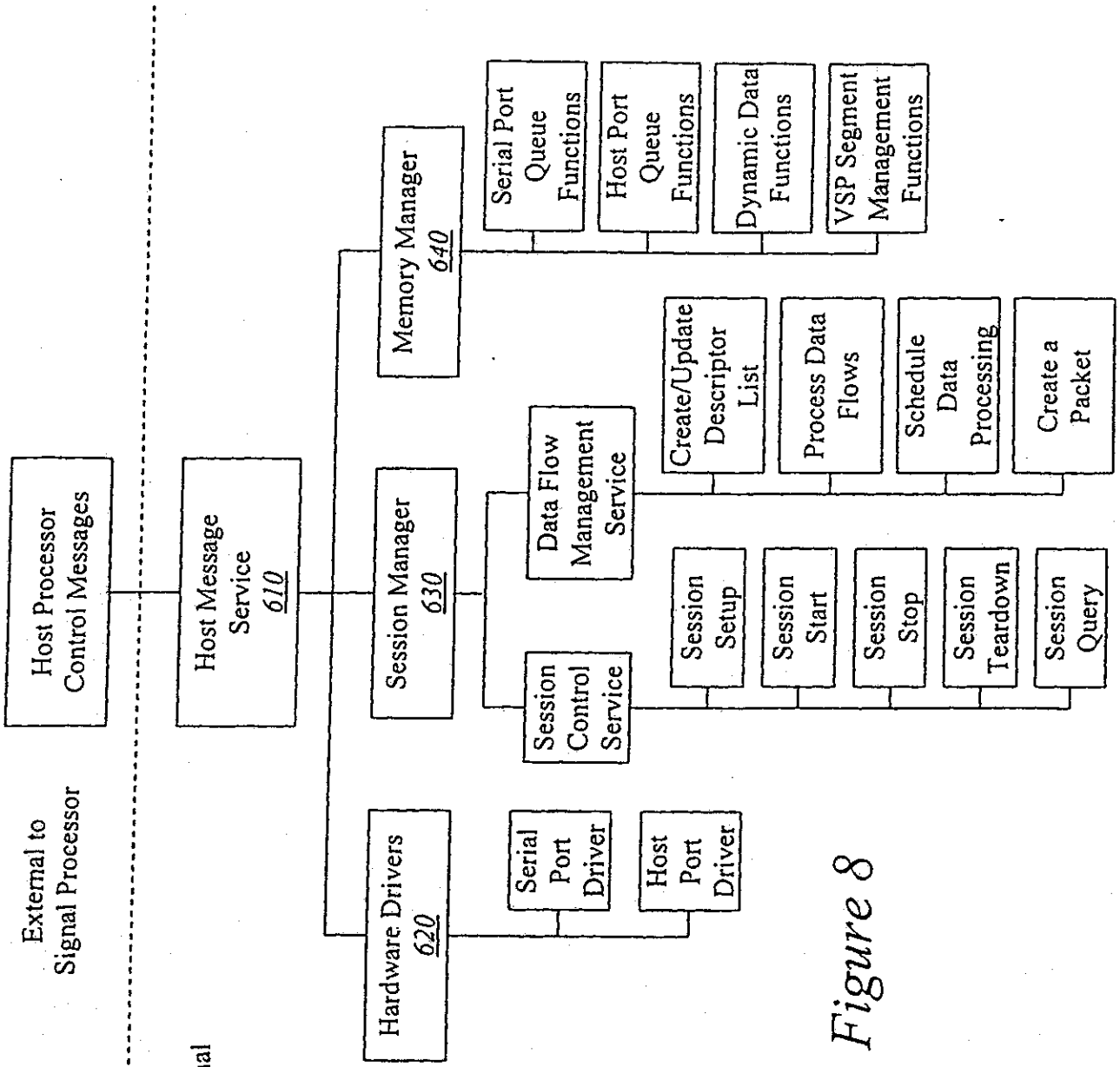

External to Signal Processor
Internal Logic of Signal Processor 600
Host Processor Control Messages
Host Message Service 610
Hardware Drivers 620
Session Manager 630
Memory Manager 640
Serial Port Driver
Host Port Driver
Session Control Service
Data Flow Management Service
Serial Port Queue Functions
Host Port Queue Functions
Dynamic Data Functions
VSP Segment Management Functions
Create/Update Descriptor List
Process Data Flows
Schedule Data Processing
Create a Packet
Session Setup
Session Start
Session Stop
Session Teardown
Session Query

Figure 8

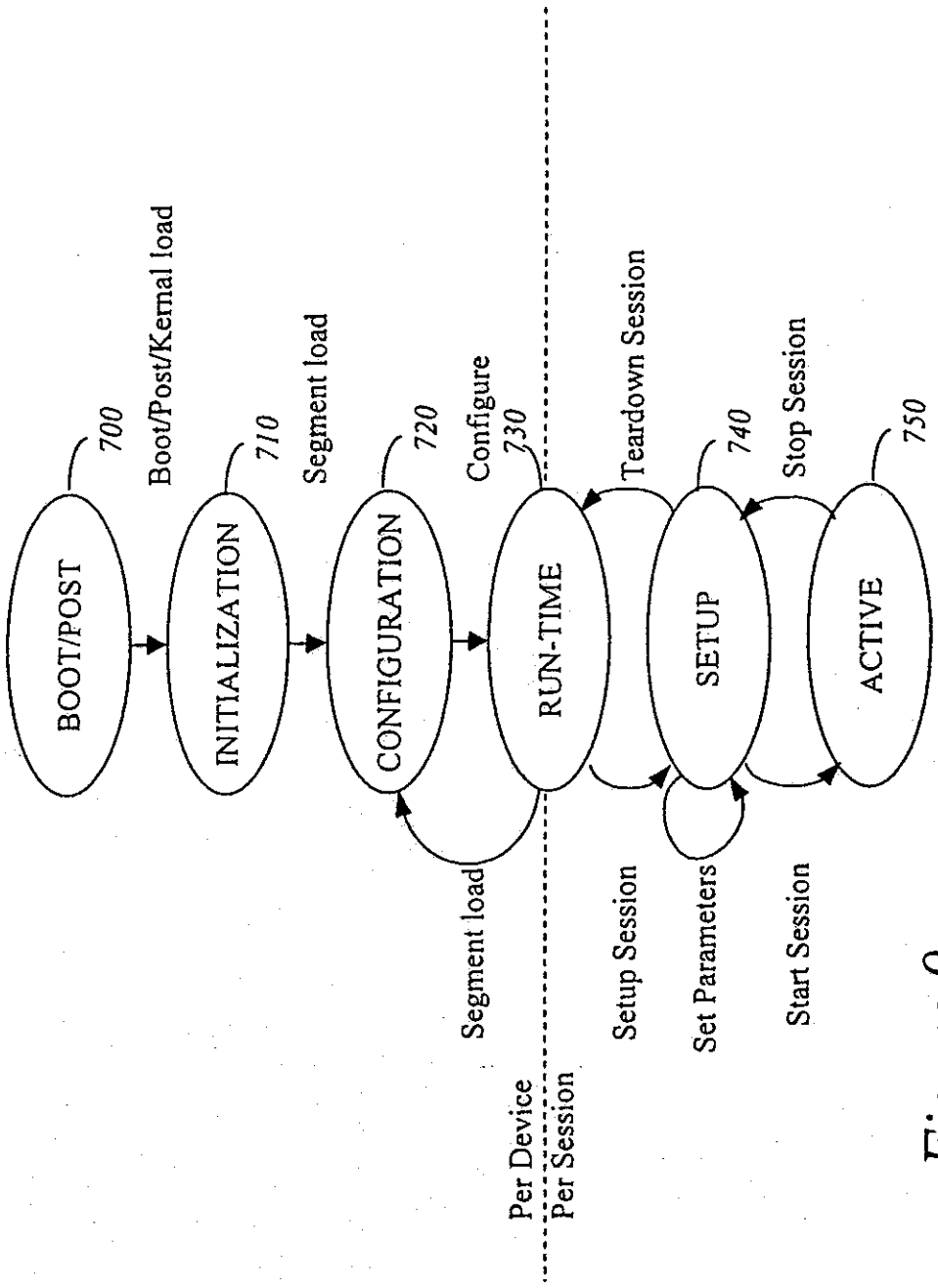

BOOT/POST
700
Boot/Post/Kernal load
INITIALIZATION
710
Segment load
CONFIGURATION
720
Configure
730
RUN-TIME
Teardown Session
SETUP
740
Stop Session
ACTIVE
750
Segment load
Setup Session
Set Parameters
Start Session
Per Device
Per Session

Figure 9

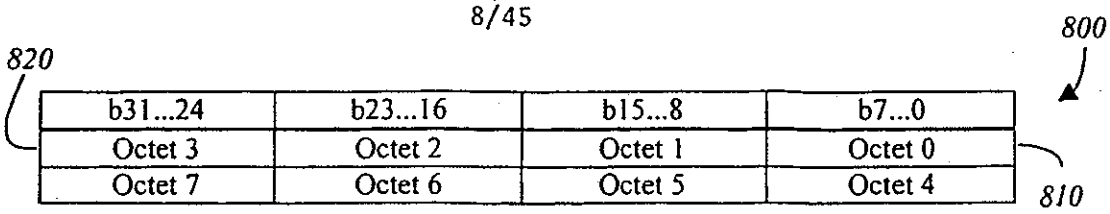


Figure 10

Title	Bit 7	6	5	4	3	2	1	Bit 0	Octet
Control Header	Dest Node *910*								0
	Source Node *920*								1
	Msg Length (7…0) *940*								2
	Priority *930*		-	Msg Type *950*		Msg Length (10..8) *940*			3
	Tag or Sequence# *960*								4
	Control Length *970*								5
	Catalog *980*								6
	Code *990*								7

900

Figure 11

1000

Catalog Name	Value	Description	
Device Control	0x00	Device Init, Config control	*1010*
Session Control	0x01	Session Setup, Teardown	*1020*
Telephony Services	0x02	Tone, DTMF Gen/Det, Echo Cancellation	*1030*
Voice Services	0x03	Voice Coder/Decoder	*1040*
Fax Services	0x04	Fax V.17, V.21, V.27, V.29, T.30, T.38	*1050*
Modem Services	0x05	Data V.32, V32bis, V.34, V.90	*1060*

Figure 12

1010

Mnemonic	Code	Description
DEV_INFO	0x00	Get Laguna Device Info
DEV_INFO_RSP	0x01	
DEV_POOL_INIT	0x02	Configure Laguna memory pools
DEV_POOL_INIT_RSP	0x03	
DEV_REPORT_CONFIG	0x04	Configure Laguna Device
DEV_REPORT_CONFIG_RSP	0x05	
SERIAL_PORT_SETUP	0x06	Configures TDM Serial ports
SERIAL_PORT_SETUP_RSP	0x07	
SEG_ALLOC	0x08	Reserve space to store a Segment
SEG_ALLOC_RSP	0x09	
SEG_ACTIVATE	0x0A	Activate a downloaded Segment
SEG_ACTIVATE_RSP	0x0B	
DEV_SET_NODE	0x0C	Configures Laguna Node ID
DEV_SET_NODE_RSP	0x0D	
PING	0xEE	Test message
ECHO	0xEF	Test message
DEV_HEARTBEAT	0xF0	Device runtime Status
DEV_STATS	0xF1	Device runtime Statistics

Figure 13

1100

Title	Bit 7	6	5	4	3	2	1	Bit 0	Octet
Node IDs	Signal Processor Node ID (default = 1) *1101*								8
	Host Node ID (default = 1) *1102*								9
	Reserved								10
	Reserved								11

Figure 14

1105

Title	Bit 7	6	5	4	3	2	1	Bit 0	Octet
Status 1106	Status LS byte								8
	...								9
	...								10
	Status MS byte								11

Figure 15

Title	Bit 7	6	5	4	3	2	1	Bit 0	Octet
Processor Info	Signal Processor Version 1111								8
	Internal Memory Size 1113								9
	Firmware Version 1112								10
	Reserved								11

1102

Figure 16

1115

Title	7	6	5	4	3	2	1	0	Octet
Serial Buffer Cfg.	Serial Buffer Size Lo								8
	Serial Buffer Size Hi								9
	Num of TDM Buffers Lo								10
	Num of TDM Buffers Hi								11
Host Port Buffer Cfg.	Host Port Buffer Size Lo								12
	Host Port Buffer Size Hi								13
	Num of Host Port Buffers Lo								14
	Num of Host Port Buffers Hi								15
Dynamic Mem Buffer Cfg.	Dynamic Mem Buffer Size Lo								16
	Dynamic Mem Buffer Size Hi								17
	Num of Dynamic Mem Buffers Lo								18
	Num of Dynamic Mem Buffers Hi								19

1116
1117
1118

Figure 17

1120

Title	Bit 7	6	5	4	3	2	1	Bit 0	Octet
Status *1121*	Status LS byte								8
	...								9
	...								10
	Status MS byte								11

Figure 18

1125

Title	Bit 7	6	5	4	3	2	1	0	Octet	
Device Cfg.	DEV_HEARTBEAT Frequency Lo								8	1126
	DEV_HEARTBEAT Frequency Hi								9	
	DEV_STATISTIC Frequency Lo								10	1127
	DEV_STATISTIC Frequency Hi								11	
	Device Debug Config/Level Lo								12	
	Device Debug Config/Level Hi								13	
	Reserved								14	
	Reserved								15	

Figure 19

Title	Bit 7	6	5	4	3	2	1	Bit 0	Octet
Status *1131*	Status LS byte								8
	...								9
	...								10
	Status MS byte								11

1130

Figure 20

1136

1135

Title	Bit 7	6	5	4	3	2	1	Bit 0	Octet
HB Seq Num	Heartbeat # Lo								8
	Heartbeat # Hi								9
	Reserved								10
	Reserved								11

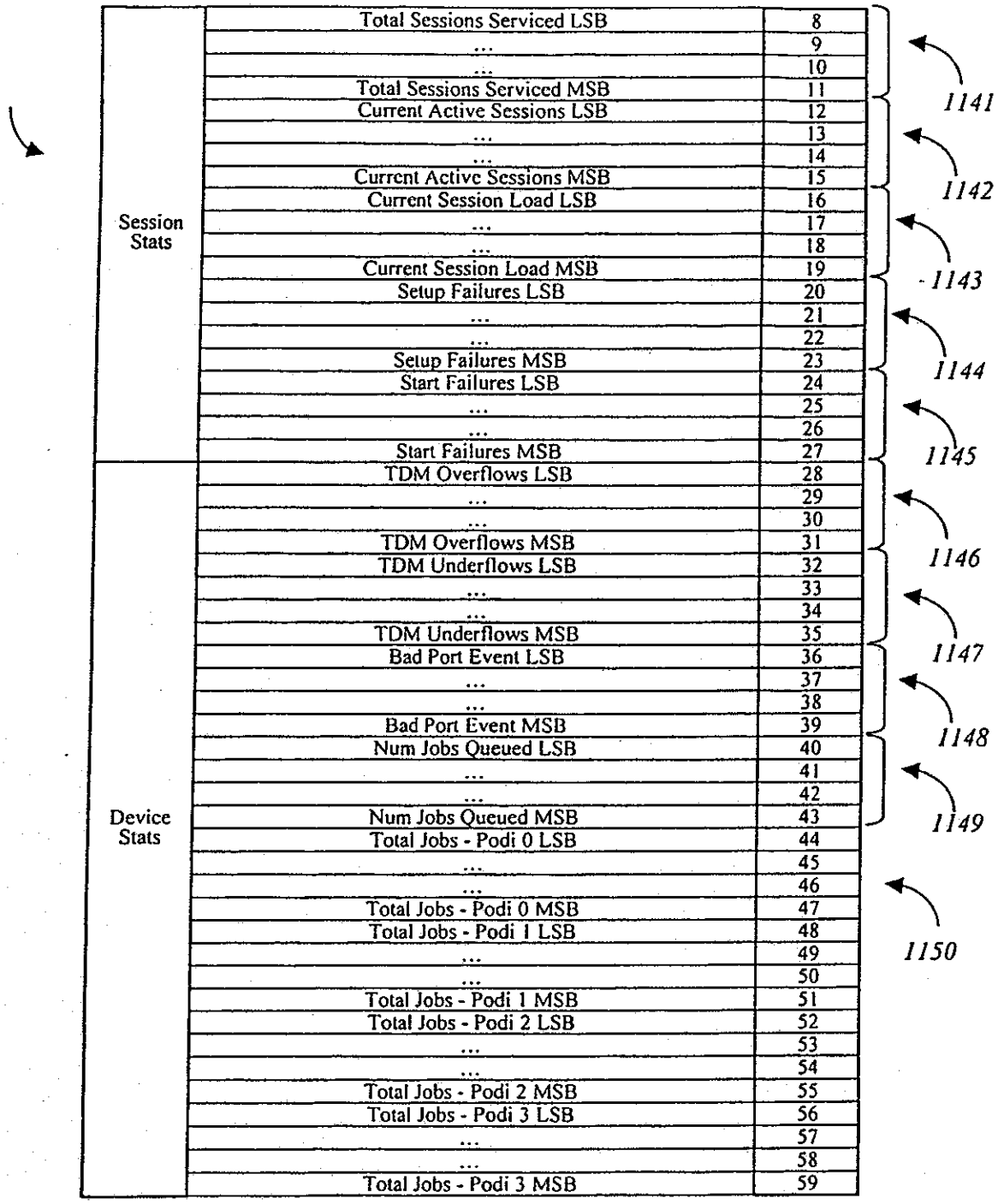
Figure 21

2030

Title	Bit 7	6	...	Bit 0	Octet
MSB Block *2031*	MSB/S8	MSB/S7	...	MSB/S1	8
			:		:
	MSB/S40	MSB/S39	...	MSB/S33	12
MSB-1 Block *2032*	(MSB-1)/S8	(MSB-1)/S7	...	(MSB-1)/S5	13
			:		:
	(MSB-1)/S40	(MSB-1)/S39	...	(MSB-1)/S33	17
:			...		
LSB Block	LSB/S8	LSB/S7	...	LSB/S1	43
			:		...
	LSB/S40	LSB/S39	...	LSB/S33	47

2025

Figure 89



Session Stats	Total Sessions Serviced LSB	8	1141
	...	9	
	...	10	
	Total Sessions Serviced MSB	11	
	Current Active Sessions LSB	12	1142
	...	13	
	...	14	
	Current Active Sessions MSB	15	
	Current Session Load LSB	16	1143
	...	17	
	...	18	
	Current Session Load MSB	19	
	Setup Failures LSB	20	1144
	...	21	
	...	22	
	Setup Failures MSB	23	
	Start Failures LSB	24	1145
	...	25	
	...	26	
	Start Failures MSB	27	
Device Stats	TDM Overflows LSB	28	1146
	...	29	
	...	30	
	TDM Overflows MSB	31	
	TDM Underflows LSB	32	1147
	...	33	
	...	34	
	TDM Underflows MSB	35	
	Bad Port Event LSB	36	1148
	...	37	
	...	38	
	Bad Port Event MSB	39	
	Num Jobs Queued LSB	40	1149
	...	41	
	...	42	
	Num Jobs Queued MSB	43	
	Total Jobs - Podi 0 LSB	44	1150
	...	45	
	...	46	
	Total Jobs - Podi 0 MSB	47	
	Total Jobs - Podi 1 LSB	48	
	...	49	
	...	50	
	Total Jobs - Podi 1 MSB	51	
	Total Jobs - Podi 2 LSB	52	
	...	53	
	...	54	
	Total Jobs - Podi 2 MSB	55	
	Total Jobs - Podi 3 LSB	56	
	...	57	
	...	58	
	Total Jobs - Podi 3 MSB	59	

Figure 22

1156	Port	-						SPNUM		8
		1167	1166	-						9
1157	Rx Control	DCS	FSP	FSS	1165	1170 -		1168		10
		CKD	FSD	DER	DES	DBD 1169		DCP		11
1158	Rx Chan Control	1173	1172	1171	MAX_RCC 1176					12
		RCS 1175								13
1159	Rx Clk Control	- 1183			EN	SNC	SP	SM		14
		DIV 1180				1184	1182	1181		15
1160	Rx FS Control	1187	1186	FPER (7..0)					1185	16
1161		EN	GO	FPER (13..8)						17
1162	Tx Control	DCS	FSP	FSS	-					18
		CKD	FSD	DER	DES	DBD		DCP		19
1163	Tx Chan Control	MAX_TCC								20
		TCS								21
1164	Tx Clk Control	-			EN	SNC	SP	SM		22
		DIV								23
	Tx FS Control	FPER (7..0)								24
		EN	GO	FPER (13..8)						25
	-	Reserved								26
	-	Reserved								27

1155

Figure 23

Title	Bit 7	6	5	4	3	2	1	Bit 0	Octet
Status Field	Status LS byte								8
	...								9
	...								10
	Status MS byte								11
Port 1201	- 1206							SPNUM	12
	- 1205							EN	13
	Reserved								14
	Reserved								15

1200

Figure 24

1210

Title	Bit 7	6	5	4	3	2	1	0	Octet
	Reserved								8
	Reserved								9
Segment Size	Memory Space Size Lo								10
	Memory Space Size Hi								11

1211

Figure 25

Title	Bit 7	6	5	4	3	2	1	Bit 0	Octet
Status (1216)	Status LS byte								8
	...								9
	...								10
	Status MS byte								11
Segment Start Addr (1217)	Start Address LS byte								12
	...								13
	...								14
	Start Address MS byte								15

1215

Figure 26

Title	Bit 7	6	5	4	3	2	1	Bit 0	Octet
Status *1221*	Status LS byte								8
	...								9
	...								10
	Status MS byte								11

1220

Figure 27

1300

Mnemonic	MsgCode	Description
SESSION_SETUP	0x00	Sets up a Voice Session
SESSION_SETUP_RSP	0x01	
SESSION_START	0x02	Activates a Session
SESSION_START_RSP	0x03	
SESSION_STOP	0x04	De-activates a Session
SESSION_STOP_RSP	0x05	
SESSION_TEARDOWN	0x06	Tears down a Voice Session
SESSION_TEARDOWN_RSP	0x07	
SESSION_QUERY	0x08	Session Query
SESSION_QUERY_RSP	0x09	
SESSION_TEST	0x0A	Put Session in a Test Mode
SESSION_TEST_RSP	0x0B	
SESSION_STATS_REQUEST	0x0C	Request Session Statistics Report
SESSION_STATS_REQUEST_RSP	0x0D	Session Statistics Report

Figure 28

	Title	Bit 7	6	5	4	3	2	1	Bit 0	Octet
1306	Session ID	SessionID Lo								8
		SessionID Hi								9
1307	Service Setup	Coder Service 1315								10
		1320 1329 Decoder Service 1316								11
1308	Telephony	TDMType		Test Mode 1322			1326 ECS 1321			12
		-	Mute	VAD	IBOB	TG	DTG	TD	DTD	13
1309	Near End Channels	1327 1328 Near Rx Addr (7…0) 1325 1324 1323								14
		-				Near Rx Addr (11..8) 1330				15
		Near Tx Addr (7..0)								16
1310		-				Near Tx Addr (11..8) 1331				17
	Far End Channels	Far Rx Addr (7..0)								18
		-				Far Rx Addr (11..8) 1332				19
		Far Tx Addr (7..0)								20
		-				Far Tx Addr (11..8) 1333				21
1311	Near End Tag	Near End Tag Lo								22
		Near End Tag Hi								23
1312	Far End Tag	Far End Tag Lo								24
		Far End Tag Hi								25
		Reserved								26
		Reserved								27

1305

Figure 29

Coder/Decoder Service (8-bit)	Coder Output / Decoder Input
0x00	No Coder/Decoder
0x01	G 711 Mu-law, 40 bytes
0x02	G 711 Mu-law, 80 bytes
0x03	G 711 Mu-law, 240bytes
0x04	G.711 Mu-law, 160 bytes
...	
0x08	G 711 A-law, 40 bytes
0x09	G 711 A-law, 80 bytes
0x0A	G 711 A-law, 240 bytes
0x0B	G 711 A-law, 160 bytes
...	
0x10	PCM Linear (16-bit), 40 samples
0x11	PCM Linear (16-bit), 80 samples
0x12	PCM Linear (16-bit), 240 samples
0x13	PCM Linear (16-bit), 160 samples
...	
0x18	G 723.1 (5.3 kbps)
0x19	G 723.1 (6.3 kbps)
0x20	G 729 A/B (8 Kbps)
...	
0x30	G 726-16, 40 samples
0x31	G 726-16, 80 samples
0x32	G 726-16, 240 samples
0x33	G 726-16, 160 samples
0x34	G 726-24, 40 samples
0x35	G 726-24, 80 samples
0x36	G 726-24, 240 samples
0x37	G 726-24, 160 samples
0x38	G 726-32, 40 samples
0x39	G 726-32, 80 samples
0x3A	G 726-32, 240 samples
0x3B	G 726-32, 160 samples
0x3C	G 726-40, 40 samples
0x3D	G 726-40, 80 samples
0x3E	G 726-40, 240 samples
0x3F	G 726-40, 160 samples
...	
0x40	GSM
...	...
0x80	FAX demod/remod (V.27/V.29/V.17)
...	
0x90	V.32 Modem
0x91	V.34 Modem
0x92	V.90 Modem
...	
0xA0	Transcoder: GSM to G 729A
0xA1	Transcoder: G 729A to GSM
...	...
0xF0	Loop back (Near-in to Near-out/Far-in to Far-out), 40 samples
0xF1	Loop back (Near-in to Near-out/Far-in to Far-out), 80 samples
0xF2	Loop back (Near-in to Near-out/Far-in to Far-out), 240 samples
0xF3	Loop back (Near-in to Near-out/Far-in to Far-out), 160 samples
0xF4	Pass Through (Near-in to Far-out/ Far-in to Near-out), 40 samples
0xF5	Pass Through (Near-in to Far-out/ Far-in to Near-out), 80 samples
0xF6	Pass Through (Near-in to Far-out/ Far-in to Near-out), 240 samples
0xF7	Pass Through (Near-in to Far-out/ Far-in to Near-out), 160 samples

Figure 30

Value (3-bit)	Echo Cancellation Setup
0	No Echo Cancellation
1	8ms EC tail length
2	16 ms EC tail length
3	32 ms EC tail length
4	64 ms EC tail length
5	128 ms EC tail length
6	96 ms EC tail length
7	Reserved

Figure 31

Value (3-bit)	Test Mode
0	Normal Operation
1	Coder Loopback
2	Decoder Loopback
3-7	Reserved

Figure 32

Address (12-bit)	Description
0x000..0x1FF	Serial Port Channel (TDM Slot)
0x200..0x3FF	Future
0x400..0x5FF	Host Port Channel (Queue #)
0x600..0x7FF	Future
0x800..0xFEF	Reserved
0xFF0	Flow not valid
0xFF1	Any Serial Port Channel
0xFF2	Any Host Port Channel
0xFF3..0xFFF	Reserved

Figure 33

Title	Bit 7	6	5	4	3	2	1	Bit 0	Octet
Status *1336*	Status LS byte								8
	...								9
	...								10
	Status MS byte								11
Session ID *1337*	SessionID Lo								12
	SessionID Hi								13
Near End Channels *1338*	Near Recv Addr (7..0)								14
	-				Near Recv Addr (11..8) *1341*				15
	Near Xmit Addr (7..0)								16
	-				Near Xmt Addr (11..8) *1342*				17
Far End Channels *1339*	Far Recv Addr (7..0)								18
	-				Far Recv Addr (11..8) *1343*				19
	Far Xmit Addr (7..0)								20
	-				Far Xmt Addr (11..8) *1344*				21
Session Load *1340*	Current Session Load LS Byte								22
	...								23
	...								24
	Current Session Load MS Byte								25
	Reserved								26
	Reserved								27

1335

Figure 34

Title	Bit 7	6	5	4	3	2	1	Bit 0	Octet
Session ID	SessionID Lo								8
	SessionID Hi								9
	Reserved								10
	Reserved								11

1346

1345

Figure 35

Title	Bit 7	6	5	4	3	2	1	0	Octet
Status *1351*	Status LS byte								8
	...								9
	...								10
	Status MS byte								11
Session ID	Session ID Lo								12
	Session ID Hi								13
	Reserved								14
	Reserved								15

1350

1352

Figure 36

Title	Bit 7	6	5	4	3	2	1	Bit 0	Octet
Session ID	SessionID Lo								8
	SessionID Hi								9
	Reserved								10
	Reserved								11

1356

1355

Figure 37

Title	Bit 7	6	5	4	3	2	1	0	Octet
Status *1361*	Status LS byte								8
	...								9
	...								10
	Status MS byte								11
Session ID	Session ID Lo								12
	Session ID Hi								13
	Reserved								12
	Reserved								13

1360

1362

Figure 38

Title	Bit 7	6	5	4	3	2	1	Bit 0	Octet
Session ID *1366*	SessionID Lo								8
	SessionID Hi								9
	Reserved								10
	Reserved								11

1365

Figure 39

Title	Bit 7	6	5	4	3	2	1	0	Octet
Status *1371*	Status LS byte								8
	...								9
	...								10
	Status MS byte								11
Session ID	Session ID Lo								12
	Session ID Hi								13
	Reserved								12
	Reserved								13

1370

1372

Figure 40

Title	Bit 7	6	5	4	3	2	1	Bit 0	Octet
Session ID *1376*	SessionID Lo								8
	SessionID Hi								9
	Reserved								10
	Reserved								11

1375

Figure 41

Title	Bit 7	6	5	4	3	2	1	Bit 0	Octet
Status *1381*	Status LS byte								8
	...								9
	...								10
	Status MS byte								11
Session ID	SessionID Lo								12
	SessionID Hi								13
Service	Coder Service								14
	Decoder Service								15
Telephony	TDMType		Test Mode			ECS			16
	-	Mute	VAD	IBOB	TG	DTG	TD	DTD	17
Near End Channels	Near Recv Addr (7..0)								18
	-				Near Recv Addr (11..8)				19
	Near Xmit Addr (7..0)								20
	-				Near Xmt Addr (11..8)				21
Far End Channels	Far Recv Addr (7..0)								22
	-				Far Recv Addr (11..8)				23
	Far Xmit Addr (7..0)								24
	-				Far Xmt Addr (11..8)				25
Near End Tag	Near End Tag Lo								26
	Near End Tag Hi								27
Far End Tag	Far End Tag Lo								28
	Far End Tag Hi								29
State	Session State Lo								30
	Session State Hi								31

1380

Figure 42

Title	Bit 7	6	5	4	3	2	1	Bit 0	Octet
Session ID *1386*	SessionID Lo								8
	SessionID Hi								9
-	Reserved								10
	Reserved								11

1385

Figure 43A

Title	Bit 7	6	5	4	3	2	1	Bit 0	Octet
Status *1392*	Status LS byte								8
	....								9
	....								10
	Status MS byte								11
Session ID *1391*	SessionID Lo								12
	SessionID Hi								13
-	Reserved								14
	Reserved								15
Frame Count	Frame Count Lo								16
	Frame Count Hi								17
Bad Frames	Bad Frame Count Lo								18
	Bad Frame Count Hi								19
Near End Errors	Rx Overflow *1396*								20
	Tx Underflow *1397*								21
Far End Errors	Rx Overflow *1398*								22
	Tx Underflow *1399*								23

1390

1393

1394

1395

Figure 43B

1400

Mnemonic	Msg Code	Description
SET_EC_PARMS	0x00	Set Echo Cancel Parameters
SET_EC_PARMS_RSP	0x01	
SET_DTMF_PARMS	0x02	Set DTMF Parameters
SET_DTMF_PARMS_RSP	0x03	
SET_TONE_FREQ	0x04	Set TONE Frequency parameters
SET_TONE_FREQ_RSP	0x05	
SET_TONE_CADENCE_ON	0x06	Set TONE Cadence On Times
SET_TONE_CADENCE_ON_RSP	0x07	
SET_TONE_CADENCE_OFF	0x08	Set TONE Cadence Off Times
SET_TONE_CADENCE_OFF_RSP	0x09	
SET_TONE_THRESH_HI	0x0A	Set TONE Thresholds Hi
SET_TONE_THRESH_HI_RSP	0x0B	
SET_TONE_THRESH_LO	0x0C	Set TONE Thresholds Lo
SET_TONE_THRESH_LO_RSP	0x0D	
REQ_EC_PARMS	0x10	Request EC parameters
REQ_EC_PARMS_RSP	0x11	
REQ_DTMF_PARMS	0x12	Request DTMF parameters
REQ_DTMF_PARMS_RSP	0x13	
REQ_TONE_FREQ	0x14	Request TONE Frequency parameters
REQ_TONE_FREQ_RSP	0x15	
REQ_TONE_CADENCE_ON	0x16	Request TONE Cadence – on times
REQ_TONE_CADENCE_ON_RSP	0x17	
REQ_TONE_CADENCE_OFF	0x18	Request TONE Cadence – off times
REQ_TONE_CADENCE_OFF_RSP	0x19	
REQ_TONE_THRESH_HI	0x1A	Request TONE Thresholds - high
REQ_TONE_THRESH_HI_RSP	0x1B	
REQ_TONE_THRESH_LO	0x1C	Request TONE Thresholds - low
REQ_TONE_THRESH_LO_RSP	0x1D	
EC_STAT_REQUEST	0x20	Request EC Status
EC_STAT_REQUEST_RSP	0x21	EC Status Report
GEN_TONE	0x22	Generate a user selectable tone
GEN_TONE_RSP	0x23	
GEN_DTMF_DIGITS	0x24	Send DTMF String
GEN_DTMF_DIGITS_RSP	0x25	
STOP_TONE	0x26	Stop sending a tone
STOP_TONE_RSP	0x27	
DTMF_REPORT	0xF0	Report a DTMF digit detection
TONE_REPORT	0xF1	Report a Call progress tone detection
GEN_DTMF_COMPLETE	0xF2	Report completion of DTMF string generation
FAX_TONE_REPORT	0xF3	Report a Fax tone detection

Figure 44

Title	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Octet
Session ID	Session ID (Low)								8
	Session ID (High) (1412, 1411, 1410)								9
EC Param (1406)	ADPT	CNG	NLP	MuteRout	MuteSout	Freeze	Clear	EC	10
	-	-	-	-	APSelect	ERL 1413			11

1405 1407

Figure 45

Title	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Octet
Status 1416	Status LS byte								8
	...								9
	...								10
	Status MS byte								11
Session ID (1417)	Session ID (Low)								12
	Session ID (High)								13
-	Reserved								14
-	Reserved								15

1415

Figure 46

1420

Title	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Octet
Session ID (1421)	Session ID (Low)								8
	Session ID (High)								9
	Reserved								10
	Reserved								11

Figure 47

1425

Title	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Octet
Status 1426	Status LS byte								8
	...								9
	...								10
	Status MS byte								11
Session ID	Session ID (Low)								12
	Session ID (Hi)								13
EC Param	ADPT	CNG	NLP	MuteRout	MuteSout	Freeze	Clear	EC	14
	-	-	-	-	APSelect	ERL			15

Figure 48

1430

Title	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Octet
Session ID (1431)	Session ID (Low)								8
	Session ID (High)								9
	Reserved								10
	Reserved								11

Figure 49

1435

Title	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Octet
Status	Status LS byte								8
	...								9
	...								10
	Status MS byte								11
Session ID	Session ID (Low)								12
	Session ID (High)								13
Frame State	DTDS 1443	DTRms 1442	DTDet 1441	SinDet 1440	RinDet 1439	LMS_Up 1435	LMS_Init 1437	EC_OFF 1436	14
	-	Tailx2 1450	Tailx1 1449	Tailx0 1448	Resu 1447	RIN 1446	FE_prev 1445	NLP_ST 1444	15
	-	-	-	-	-	-	-	-	16
		-	-	-	-	-	-	-	17
Rin Status 1451	Rin Ave Max Energy (Low)								18
	Rin Ave Max Energy (High)								19
	Rin Ave Energy (Low)								20
	Rin Ave Energy (High)								21
	Rin Energy Peak Decay (Low)								22
	Rin Energy Peak Decay (High)								23
	Rin Hang Over (Low)								24
	Rin Hang Over (High)								25
Sin Status 1452	Sin Ave Max Energy (Low)								26
	Sin Ave Max Energy (High)								27
	Sin Ave Energy (Low)								28
	Sin Ave Energy (High)								29
	Sin Energy Peak Decay (Low)								30
	Sin Energy Peak Decay (High)								31
	Sin Hang Over (Low)								32
	Sin Hang Over (High)								33
Sout Status 1453	Sout Ave Max Energy (Low)								34
	Sout Ave Max Energy (High)								35
	Sout Ave Energy (low)								36
	Sout Ave Energy (high)								37
Double Talk 1454	Double Talk Hang Over (Low)								38
	Double Talk Hang Over (High)								39

Figure 50

Title	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Octet
Session ID *1461*	Session ID (Low)								8
	Session ID (High)								9
1462 Pulse Time	Pulse Time (0-255 * 5ms)								10
1463 Guard Time	Guard Time (0-255 *5ms)								11
1464 Inter-digit time	Inter-digit Time (0-255 *5ms)								12
1465 Volume	Volume (0 to –63 dBm0), specify without sign								13
-	Reserved								14
-	Reserved								15

1460

Figure 51

Title	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Octet
Status *1471*	Status LS byte								8
	...								9
	...								10
	Status MS byte								11
1472 Session ID	Session ID (Low)								12
	Session ID (High)								13
	Reserved								14
	Reserved								15

1470

Figure 52

Title	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Octet
1476 Session ID	Session ID (Low)								8
	Session ID (High)								9
	Reserved								10
	Reserved								11

1475

Figure 53

Title	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Octet
Status *1482*	Status LS byte								8
	...								9
	...								10
	Status MS byte								11
Session ID *1481*	Session ID (Low)								12
	Session ID (High)								13
Pulse Time	Pulse Time (0-255 *5ms)								14
Guard Time	Guard Time (0-255 *5ms)								15
Inter-digit time	Inter-digit Time (0-255 *5ms)								16
Volume	Volume (0 to –63dBm0) specified without sign								17
-	Reserved								18
-	Reserved								19

1480

Figure 54

Title	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Octet
Session ID *1486*	Session ID (Low)								8
	Session ID (High)								9
Control	Notify *1489*	X	Digit String Length (1-32) *1487*						10
-	Reserved								11
Digit IDs *1488*	Digit 1 ID								12
	Digit 2 ID								13
	Digit 3 ID								14
	Digit 4 ID								15
	...								...
	Digit 32 ID								43

1485

Figure 55

Title	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Octet
Status *1496*	Status LS byte								8
	...								9
	...								10
	Status MS byte								11
Session ID	Session ID (Low)								12
	Session ID (High)								13
-	X	X	# of digits sent (0-32)						14
-	Reserved								15

1490

Figure 56

Title	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Octet
Status *1496*	Status LS byte								8
	...								9
	...								10
	Status MS byte								11
Session ID *1497*	Session ID (Low)								12
	Session ID (High)								13
-	Reserved								14
-	Reserved								15

1495

Figure 57

	Title	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Octet
1501	Session ID	Session ID (Low)								8
		Session ID (High)								9
1502	Digit ID	X	X	Digit ID 1503						10
	End	End 1502		Reserved						11
1504	Duration	DTMF Duration (12.75 ms units) LS Byte								12
		DTMF Duration MS Byte								13
	Reserved	Reserved								14
		Reserved								15

Figure 58

	Title	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Octet
1511	Frequency Indices	Freq 0 Index (0-36)								8
		Freq 1 Index (0-36)								9
		...								...
		Freq 14 Index (0-36)								22
		Reserved								23
1512	Dictionary 1 Frequency Indices 15 = No Freq1 component	Tone 1 - Freq 1 Index (0-15)				Tone 0 - Freq 1 Index (0-15)				24
		Tone 3 - Freq 1 Index (0-15)				Tone 2 - Freq 1 Index (0-15)				25
		Tone 5 - Freq 1 Index (0-15)				Tone 4 - Freq 1 Index (0-15)				26
		...								...
		Tone 15 - Freq 1 Index (0-15)				Tone 14 - Freq 1 Index (0-15)				31
1513	Dictionary 2 Frequency Indices 15 = No Freq2 component	Tone 1 - Freq 2 Index (0-15)				Tone 0 - Freq 2 Index (0-15)				32
		Tone 3 - Freq 2 Index (0-15)				Tone 2 - Freq 2 Index (0-15)				33
		Tone 5 - Freq 2 Index (0-15)				Tone 4 - Freq 2 Index (0-15)				34
		...								...
		Tone 15 - Freq 2 Index (0-15)				Tone 14 - Freq 2 Index (0-15)				39
1514	Minimum Threshold	Threshold_min (Low byte)								40
		Threshold_min (High byte)								41
1515	Twist	Twist (Low Byte)								42
		Twist (High Byte)								43

1510

Figure 59

Title	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Octet
Cadence Table: On times	Tone 0 On time (15ms units) [LS Byte]								8
	Tone 0 On time [MS Byte]								9
	Tone 1 On Time (15ms units) [LS Byte]								10
	Tone 1 On time [MS Byte]								11
	...								...
	Tone 15 On Time (15ms Units) [LS Byte]								38
	Tone 15 On Time [MS Byte]								39

1520

Figure 60

Title	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Octet
Cadence Table: Off times	Tone 0 Off time (15ms units) [LS Byte]								8
	Tone 0 Off time [MS Byte]								9
	Tone 1 Off Time (15ms units) [LS Byte]								10
	Tone 1 Off Time [MS Byte]								11
	...								...
	Tone 15 Off Time (15ms Units) [LS Byte]								38
	Tone 15 Off Time [MS Byte]								39

1575

Figure 61

Title	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Octet
Threshold Lo Table	Tone 0 threshold Lo (Low byte)								8
	Tone 0 threshold Lo (High byte)								9
	Tone 1 threshold Lo (Low byte)								10
	Tone 1 threshold Lo (High byte)								11
	...								...
	Tone 15 threshold Lo (Low byte)								38
	Tone 15 threshold Lo (High byte)								39

1530

Figure 62

Title	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Octet
Threshold Hi Table	Tone 0 threshold Hi (Low byte)								8
	Tone 0 threshold Hi (High byte)								9
	Tone 1 threshold Hi (Low byte)								10
	Tone 1 threshold Hi (High byte)								11
	...								...
	Tone 15 threshold Hi (Low byte)								38
	Tone 15 threshold Hi (High byte)								39

1535

Figure 63

Title	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Octet
Status *1541*	Status (LS Byte)								8
									9
									10
	Status (MS Byte)								11

1540

Figure 64

Title	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Status *1396*	Status (LS Byte)							
	Status (MS Byte)							
Frequency Indices	Freq 0 Index (0-36)							
	Freq 1 Index (0-36)							
	...							
	Freq 14 Index (0-36)							
	Reserved							
Dictionary 1 Frequency Indices	Tone 1 - Freq 1 Index (0-15)				Tone 0 - Freq 1 Index (0-15)			
	Tone 3 - Freq 1 Index (0-15)				Tone 2 - Freq 1 Index (0-15)			
	Tone 5 - Freq 1 Index (0-15)				Tone 4 - Freq 1 Index (0-15)			
	...							
	Tone 15 - Freq 1 Index (0-15)				Tone 14 - Freq 1 Index (0-15)			
Dictionary 2 Frequency Indices	Tone 1 - Freq 2 Index (0-15)				Tone 0 - Freq 2 Index (0-15)			
	Tone 3 - Freq 2 Index (0-15)				Tone 2 - Freq 2 Index (0-15)			
	Tone 5 - Freq 2 Index (0-15)				Tone 4 - Freq 2 Index (0-15)			
	...							
	Tone 15 - Freq 2 Index (0-15)				Tone 14 - Freq 2 Index (0-15)			
Minimum Threshold	Threshold_min (Low byte)							
	Threshold_min (High byte)							
Twist	Twist (Low Byte)							
	Twist (High Byte)							

1545

Figure 65

Title	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Octet
Session ID (1551)	Session ID (Low)								8
	Session ID (High)								9
Tone ID (1552)	X	X	X	X	Tone ID (0-15)				10
Volume (1553)	Volume (0 to –63 dBm0) specify without sign								11
Tone Duration (1554)	Tone Duration, 15ms units, 0 = continuous [LS Byte]								12
	Tone Duration [MS Byte]								13
-	Reserved								14
-	Reserved								15

1550

Figure 66

Title	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Octet
Status 1556	Status (LS Byte)								8
	...								9
	...								10
	Status (MS Byte)								11
Session ID (1557)	Session ID (Low)								12
	Session ID (High)								13
-	Reserved								14
-	Reserved								15

1555

Figure 67

Title	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Octet
Session ID (1561)	Session ID (Low)								8
	Session ID (High)								9
Tone ID	X	X	X	X	Tone ID 1562				10
-	Reserved								11

1560

Figure 68

Title	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Octet
Status 1566	Status (LS Byte)								8
	...								9
	...								10
	Status (MS Byte)								11
Session ID (1567)	Session ID (Low)								12
	Session ID (High)								13
-	Reserved								14
-	Reserved								15

1565

Figure 69

Title	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Octet
Session ID (1571)	Session ID (Low)								8
	Session ID (High)								9
Tone ID (1572)	X	X	X	X	Tone ID (0-15)				10
-	Reserved								11
Tone Duration (1573)	Tone Duration ,total ON time in 15 ms units [LS Byte]								12
	Tone Duration [MS Byte]								13
-	Reserved								14
-	Reserved								15

1570

Figure 70

Title	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Octet
Session ID	Session ID (Low)								8
	Session ID (High)								9
Tones	X	X	X	X	X	V21 (1578)	CNG (1576)	CED (1577)	10
-	Reserved								11

1575

Figure 71

Mnemonic	MsgCode	Description
SET_VOICE_PARMS	0x00	Set up Voice Parameters
SET_VOICE_PARMS_RSP	0x01	
REQ_VOICE_PARMS	0x10	Request Current Voice Parameters
REQ_VOICE_PARMS_RSP	0x11	

1600

Figure 72

Title	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Octet
Session ID (1606)	Session ID (Low)								8
	Session ID (High) (1614, 1615)								9
Voice Parameters (1607)	ERES	DRES	Encoder Rate			Reserved			10
	ALC (1616)			SCE (1612)			HPFE (1611)	PFE (1610)	11

1605

Figure 73

Title	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Octet
Status (1621)	Status (LS Byte)								8
	...								9
	...								10
	Status (MS Byte)								11
Session ID (1622)	Session ID (Low)								12
	Session ID (High)								13
-	Reserved								14
-	Reserved								15

1620

Figure 74

Title	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Octet
Session ID (1626)	Session ID (Low)								8
	Session ID (High)								9
-	Reserved								10
-	Reserved								11

1625

Figure 75

Title	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Octet
Status *1633*	Status (LS Byte)								8
	...								9
	...								10
	Status (MS Byte)								11
Session ID *1632*	Session ID (Low)								12
	Session ID (High)								13
Voice Parameters *1631*	ERES	DRES	Encoder Rate			Reserved			14
	ALC			SCE			HPFE	PFE	15

1630

Figure 76

Mnemonic	MsgCode	Description
FAX_PARMS	0x00	Sets up Fax Parameters
FAX_PARMS_RSP	0x01	
REQ_FAX_PARMS	0x02	Request Current FAX Parameters
REQ_FAX_PARMS_RSP	0x03	
REPORT_FAX_DISCONNECT	0xF0	Report Fax DCN signal detected

1700

Figure 77

Title	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Octet
Session ID *1706*	Session ID (Low)								8
	Session ID (High) *1710*								9
FAX Parameters *1707*	System Delay *1711*					Max Modem Speed			10
	Reserved						DBG *1712*	T38	11

1705

Figure 78

Title	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Octet
Status *1716*	Status (LS Byte)								8
	...								9
	...								10
	Status (MS Byte)								11
Session ID *1717*	Session ID (Low)								12
	Session ID (High)								13
-	Reserved								14
-	Reserved								15

1715

Figure 79

Title	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Octet
Session ID *1721*	Session ID (Low)								8
	Session ID (High)								9
-	Reserved								10
-	Reserved								11

1720

Figure 80

Title	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Octet
Status *1728*	Status (LS Byte)								8
	...								9
	...								10
	Status (MS Byte)								11
Session ID *1727*	Session ID (Low)								12
	Session ID (High)								13
FAX Parameters *1726*	System Delay				Max Modem Speed				10
	Reserved						DBG	T38	11

1725

Figure 81

Title	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Octet
Session ID	Session ID (Low)								8
	Session ID (High)								9
-	Reserved								10
-	Reserved								11

1731

1730

Figure 82

Mnemonic	MsgCode	Description
MODEM_PARMS	0x00	Sets up Modem Parameters
MODEM_PARMS_RSP	0x01	

1750

Figure 83

Title	Bit 7	6	5	4	3	2	1	0	Octet
Flow Tag	Flow/Termination Tag (LSB)								0
	Flow/Termination Tag (MSB)								1
Payload Info	Payload Buffer Length (bits 7...0)								2
	Payload Type				M	Payload buffer Length (10...8)			3
Time-stamp	Timestamp LS byte								4
	...								5
	...								6
	Timestamp MS byte								7
Payload	Data								8
									...
									S + 8

2010

2015

2020

2000

2005

2025

Figure 86

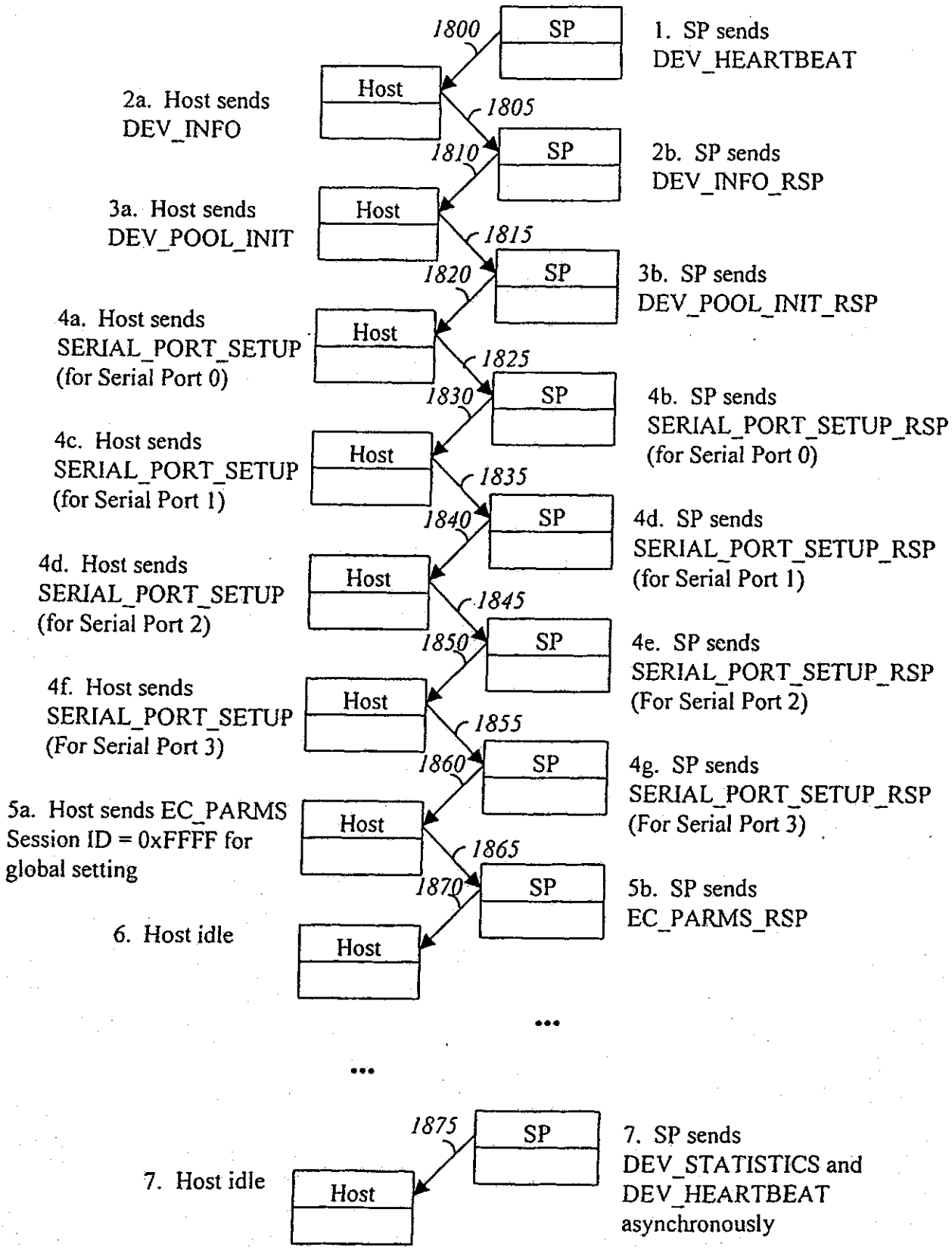

1800
SP
1. SP sends DEV_HEARTBEAT
Host
2a. Host sends DEV_INFO
1805
1810
SP
2b. SP sends DEV_INFO_RSP
Host
3a. Host sends DEV_POOL_INIT
1815
1820
SP
3b. SP sends DEV_POOL_INIT_RSP
Host
4a. Host sends SERIAL_PORT_SETUP (for Serial Port 0)
1825
1830
SP
4b. SP sends SERIAL_PORT_SETUP_RSP (for Serial Port 0)
Host
4c. Host sends SERIAL_PORT_SETUP (for Serial Port 1)
1835
1840
SP
4d. SP sends SERIAL_PORT_SETUP_RSP (for Serial Port 1)
Host
4d. Host sends SERIAL_PORT_SETUP (for Serial Port 2)
1845
1850
SP
4e. SP sends SERIAL_PORT_SETUP_RSP (For Serial Port 2)
Host
4f. Host sends SERIAL_PORT_SETUP (For Serial Port 3)
1855
1860
SP
4g. SP sends SERIAL_PORT_SETUP_RSP (For Serial Port 3)
Host
5a. Host sends EC_PARMS Session ID = 0xFFFF for global setting
1865
1870
SP
5b. SP sends EC_PARMS_RSP
Host
6. Host idle
...
...
1875
SP
7. SP sends DEV_STATISTICS and DEV_HEARTBEAT asynchronously
Host
7. Host idle

Figure 84

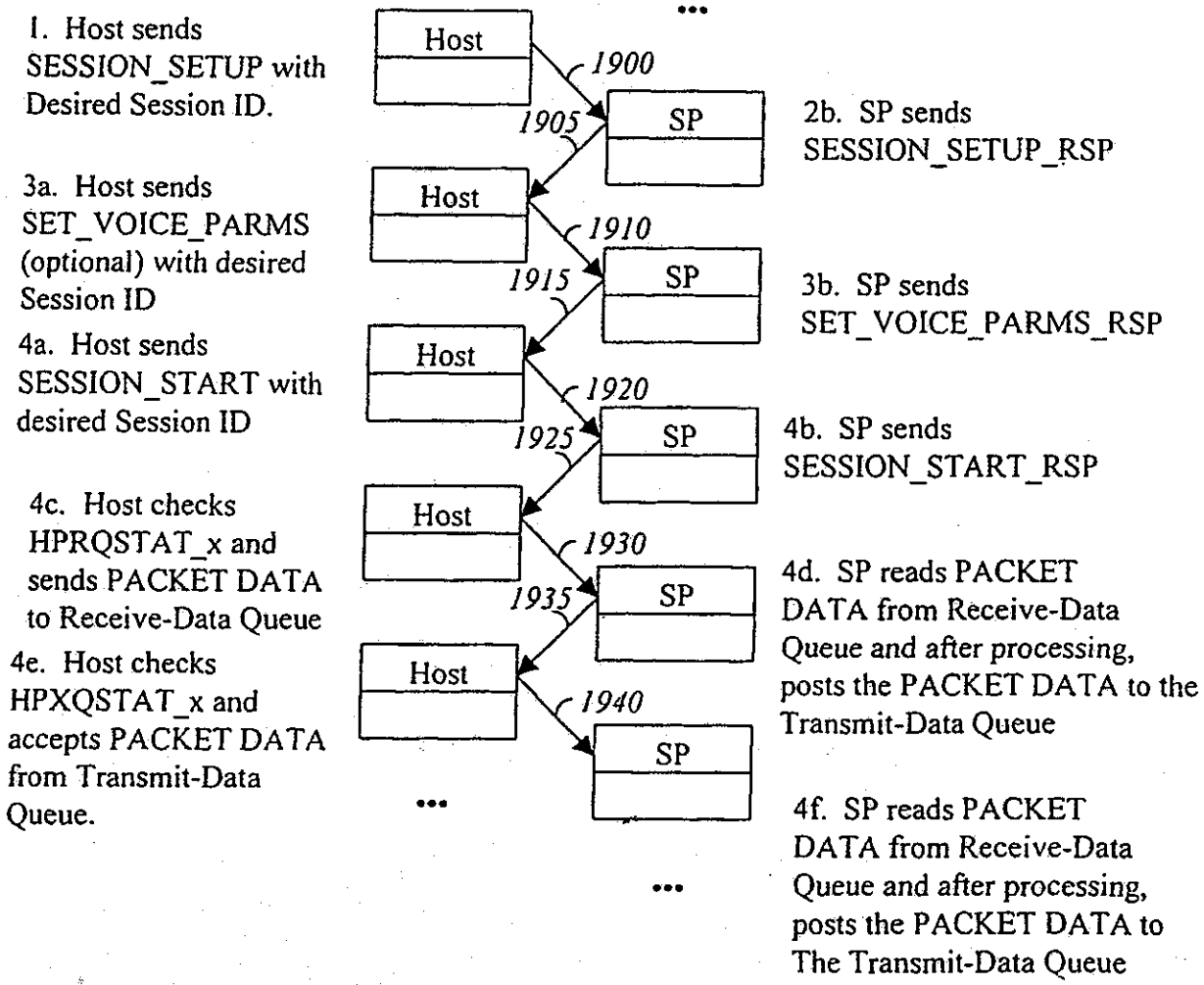

1. Host sends SESSION_SETUP with Desired Session ID.
3a. Host sends SET_VOICE_PARMS (optional) with desired Session ID
4a. Host sends SESSION_START with desired Session ID
4c. Host checks HPRQSTAT_x and sends PACKET DATA to Receive-Data Queue
4e. Host checks HPXQSTAT_x and accepts PACKET DATA from Transmit-Data Queue.
Host
SP
1900
1905
1910
1915
1920
1925
1930
1935
1940
2b. SP sends SESSION_SETUP_RSP
3b. SP sends SET_VOICE_PARMS_RSP
4b. SP sends SESSION_START_RSP
4d. SP reads PACKET DATA from Receive-Data Queue and after processing, posts the PACKET DATA to the Transmit-Data Queue
4f. SP reads PACKET DATA from Receive-Data Queue and after processing, posts the PACKET DATA to The Transmit-Data Queue

Figure 85

Payload Type (4-bit)	Description
0	Linear PCM Samples Frame
1	Encoded Voice Frame
2	Encoded Fax Frame
3	Encoded Data Frame
4	Bad Frame
5	Silence Frame
6	Telephony Signaling Event (TSE)
7	Telephony Tone
8	Transparent Data Frame
9	DTX Frame, valid for G711 and G729B codecs
10..15	Reserved

2018

Figure 87

Title	Bit 7	6	5	4	3	2	1	Bit 0	Octet
PCM Sample 1	Sample # 1 (7..0)								8
	Sample # 1 (15..8)								9
PCM Sample 2	Sample # 2 (7..0)								10
	Sample # 2 (15..8)								11
...	...								..
	...								..
PCM Sample M	Sample # M (7..0)								8+(M-1)*2
	Sample # M (15..8)								9+(M-1)*2

Figure 88