Using emutel™ Harmony to test to ETSI TS186 025-2

Terry Simpson

CEO of arcatech Ltd
E: tsimpson@arcatech.com

Workshop
IMPLEMENTATION EXPERIENCE OF NETWORK PERFORMANCE PARAMETERS CONTROL SYSTEMS AND GRANTING REQUIRED LEVEL OF SERVICES QUALITY ON THE OPERATOR NETWORKS. SENSOR NETWORKS – AS OPTIMIZATION TOOL FOR VEHICULAR TRAFFIC FLOW

Arcatech – emutel™ Harmony Presentation

1. Introduction to arcatech Ltd

2. Introduction to emutel™ Harmony

3. Implementation of ETSI call flows
   ETSI TS186 025-2 Annex A.2

4. Implementation of ETSI Use Cases
   ETSI TS186 025-2 Section 5

5. Load profiles, ramp, poisson

6. Test reports

Arcatech – emutel™ Harmony Presentation

About us...

Based Lisburn, United Kingdom

Design, manufacture and support telecom testing equipment

Arcatech's products have been providing test solutions for over 20 years

Arcatech – emutel™ Harmony Presentation

emutel™ Harmony Chassis Options:

soft|harmony

USB dongle

SIP / H.323 Bulk
Call Generator

harmony|compact

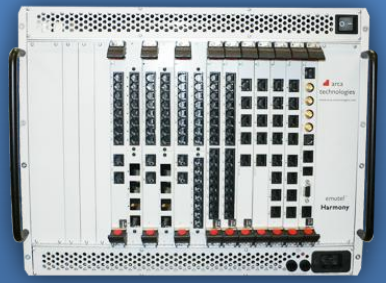
1 card system

Network Simulation
Call Generation
VoIP, ISDN, POTS

harmony|developer

5 card system

Network Simulation
Call Generation
VoIP, ISDN, POTS



harmony|enterprise

15 card system

Network Simulation
Call Generation
VoIP, ISDN, POTS

Arcatech – emutel™ Harmony Presentation

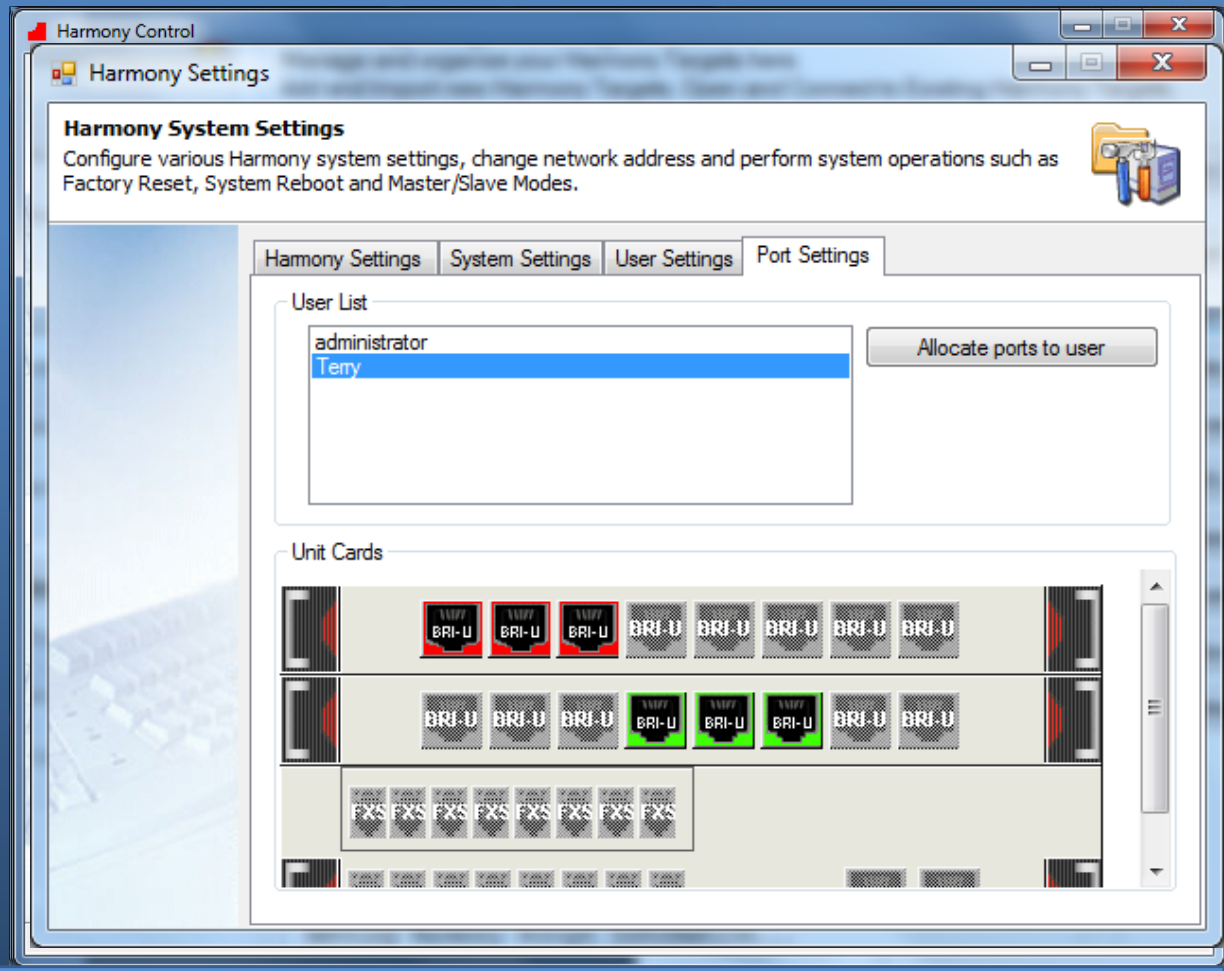
emutel™ Harmony Control Application:

Control application –
used for system management.

Unit configuration and upgrade.

Script/Test case management.

Multi-user configuration.



Arcatech – emutel™ Harmony Presentation

emutel™ Harmony Composer Application:

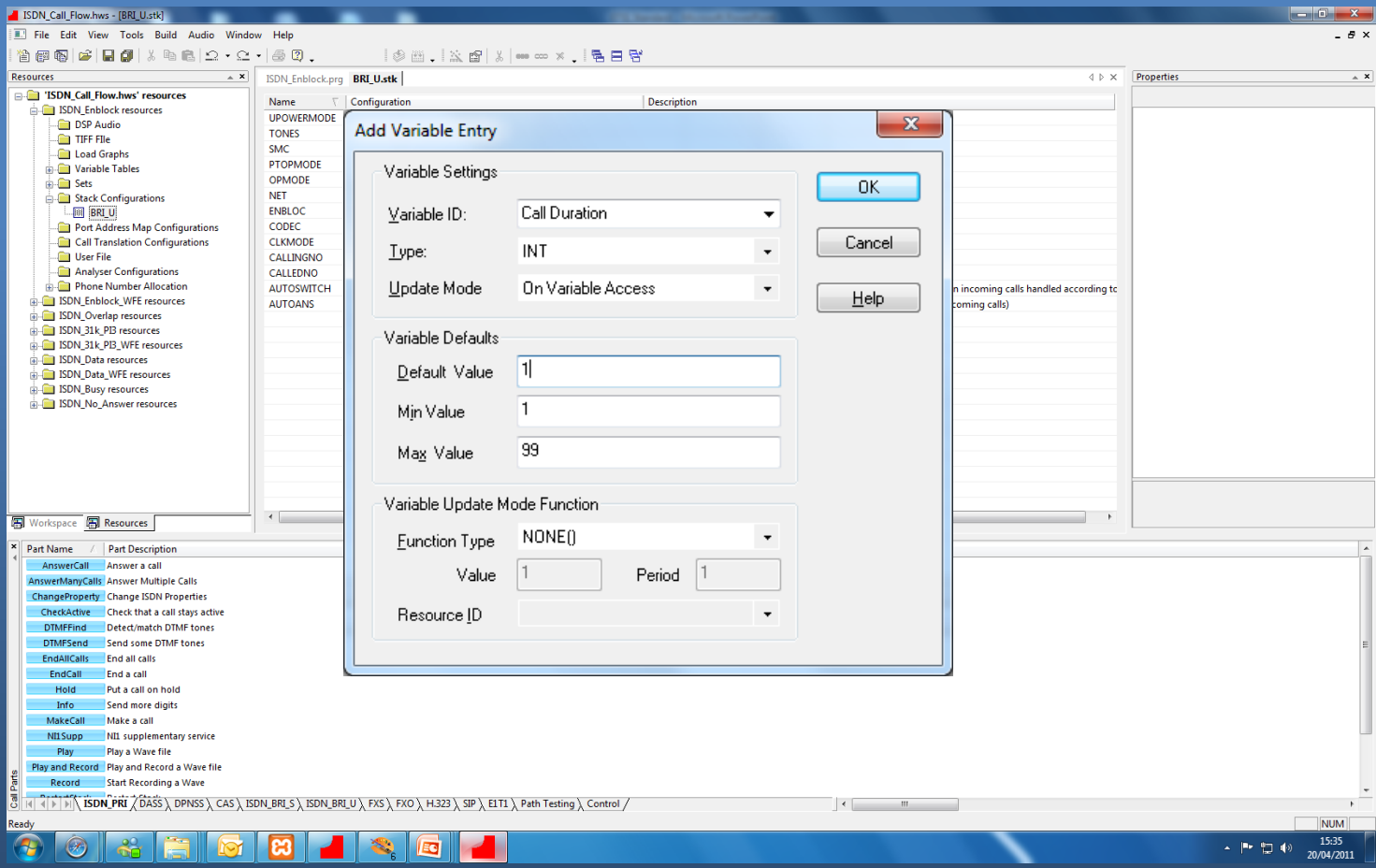
Composer – used for script test case creation

Script resources - enables you to add audio files, list of telephone numbers

Configure individual call part parameters

Setup stack parameters

Create variables



Arcatech – emutel™ Harmony Presentation

emutel™ Harmony Conductor Application:

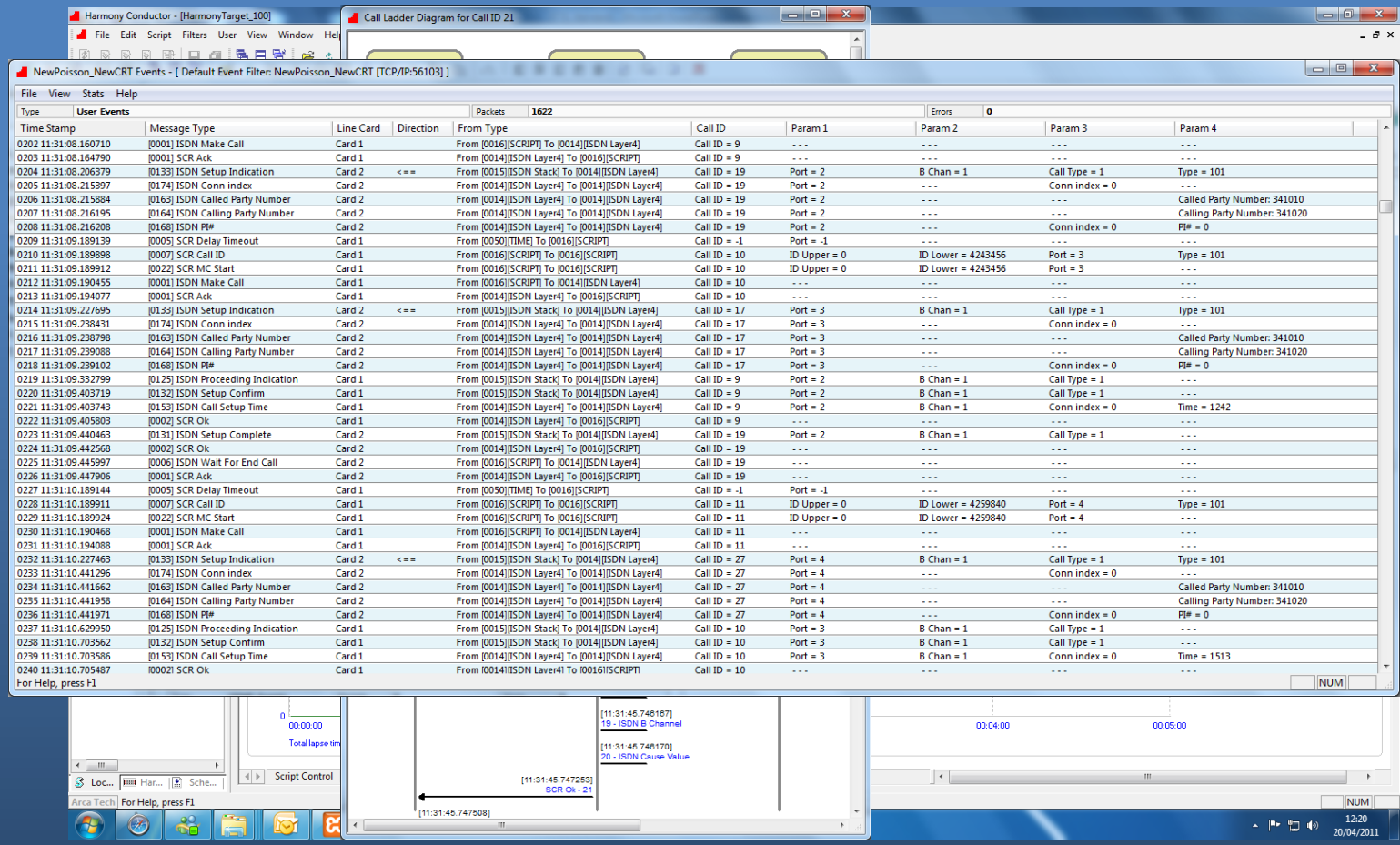
Conductor – used for script execution and analysis of results

Live indication of running script.

Live graphing indicating active calls and call rates over time.

Call Ladder Diagrams.

Call Events.



Arcatech – emutel™ Harmony Presentation

emutel™ Harmony features:

Multiple Interfaces supported in one system.

Multiple protocols supported simultaneously on each line card.

Ports configurable to be either Network or User side.

Individual port configuration, allowing for multiple test scenarios in one script.

Multiple units controlled as if they were all one.

Arcatech – Implementation of call flows

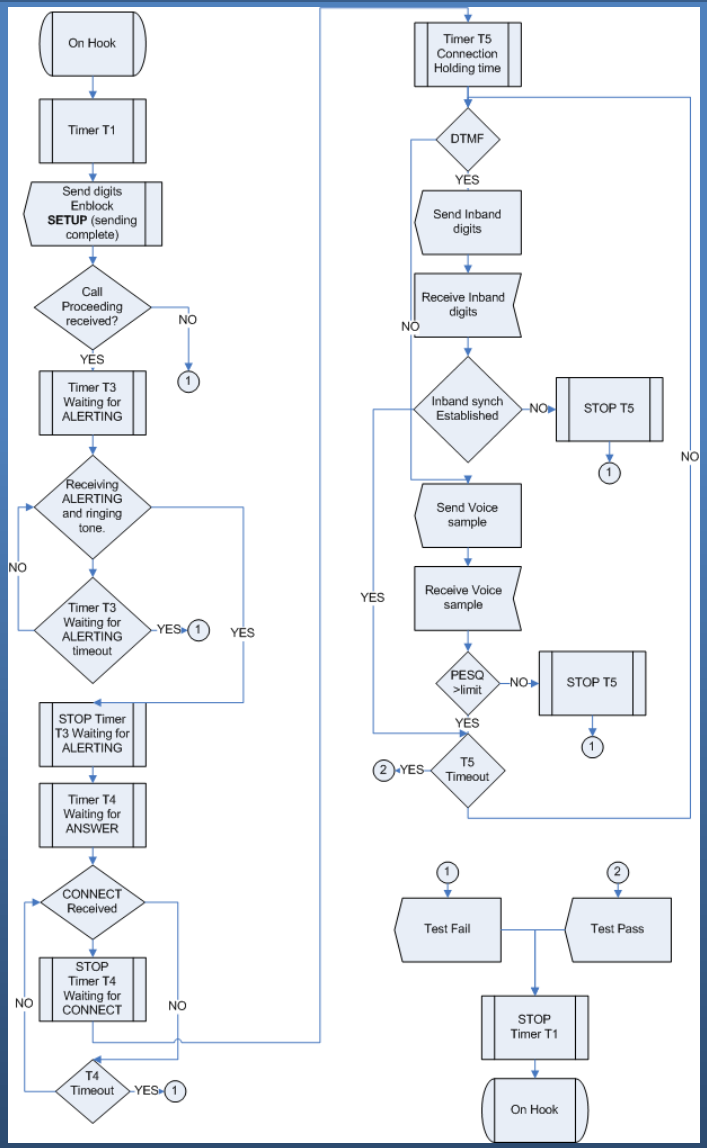
ETSI call flows: 2 examples

ETSI TS186 025-2 v<2.0.12> Annex A.2.4 – ISDN user making a call
The Harmony call parts required to implement call flow

ETSI TS186 025-2 v<2.0.12> Annex A.2.5 – ISDN user answering a call
The Harmony call parts required to implement call flow

ETSI TS186 025-2 v<2.0.12> Annex A.2.4

The call flow for the ISDN environment for voice calling side with enblock sending



MC - Make Call, transmits a setup message to the network and waits for the required messages to establish a connection.

RPTST – Repeat Start, can be used to configure how long the call will last for.

DTMFS – DTMF Send, will send a string of DTMF digits during the call.

DTMFF – DTMF Find, will wait for a predefined string of DTMF digits.

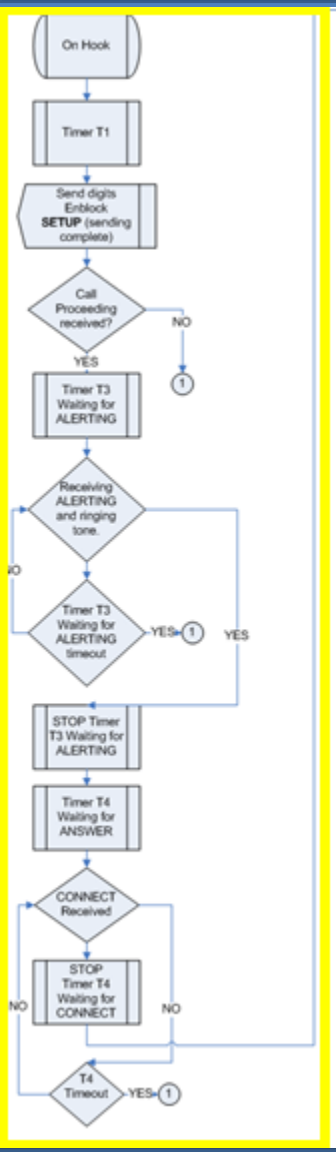
RPTND – Repeat End, the end of the repeat loop.

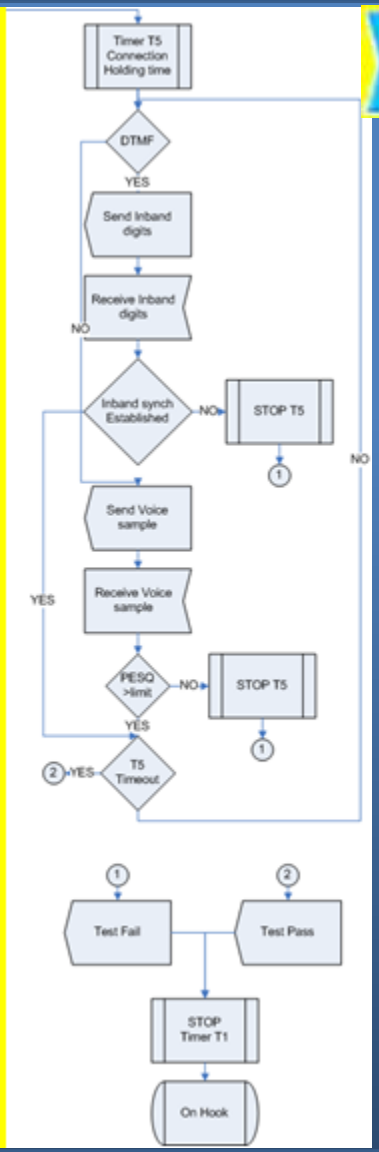
EC – End Call, transmits the required messages to end the call.

Call flow over view

ETSI TS186 025-2 v<2.0.12> Annex A.2.4

The call flow for the ISDN environment for voice calling side with enblock sending





MakeCall Properties	
General Properties	
Enabled	
TIMEOUT	0
COMPLETION	
CAUSE	
TYPE	
ENBLOC	
CALLEDNO	
CALLINGNO	
CODEC	
BEXCLUSIVE	
BCHAN	
Parameter Type	Number
BCHAN	0
TEL	
Parameter Type	String
TEL	342020
FROMTEL	
Parameter Type	String
FROMTEL	342010
DESTCALLAPP	
TIMEDIGITS	
TERMINAL	

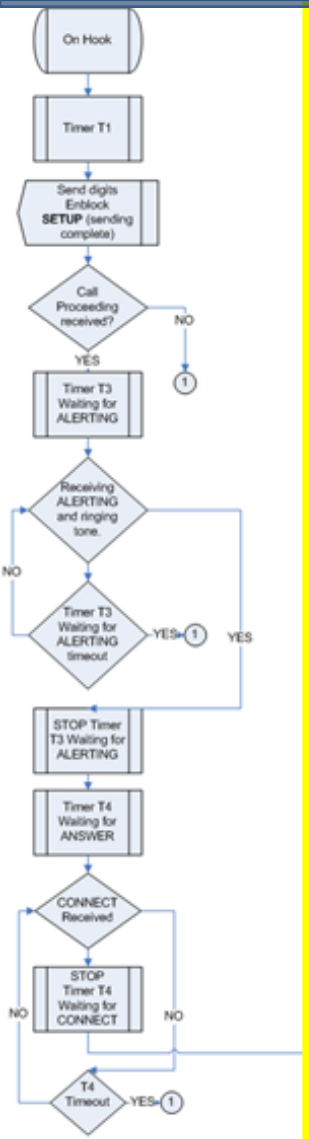
ENBLOC – can select whether the phone number should be sent Enblock or Overlap.

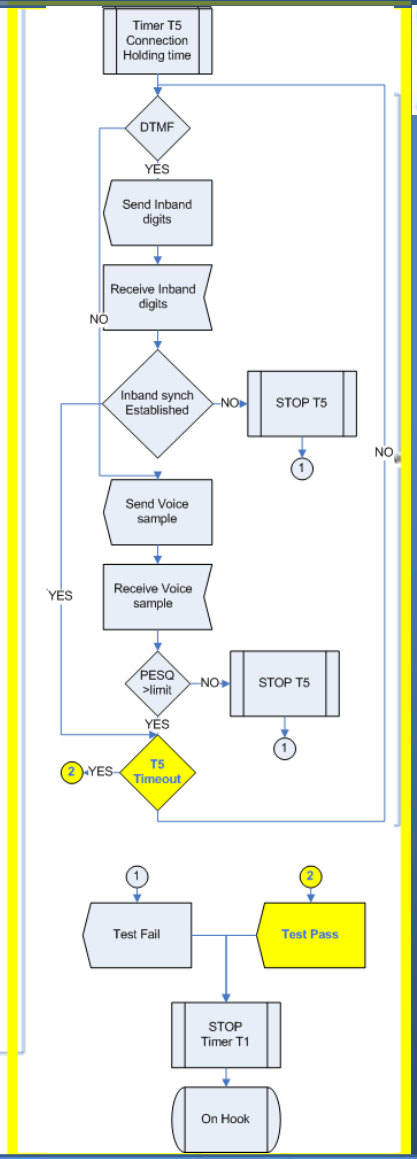
TEL – Specifies what the Called Party number should be.

FROMTEL – Specifies what the Calling Party number should be.

ETSI TS186 025-2 v<2.0.12> Annex A.2.4

The call flow for the ISDN environment for voice calling side with enblock sending





Repeat Start Properties

General Properties	
Enabled	TRUE
USEFLAG	CLEAR
DUR	
Parameter Type	Number
DUR	10000
CNT	

DTMFSend Properties

General Properties	
Enabled	TRUE
TIMEOUT	0
DTMFDURATION	50
DTMFGAP	50
DTMF	

DTMFFind Properties

General Properties	
Enabled	TRUE
TIMEOUT	0
DTMFMAXDIGITS	
DTMFDIGITS	
Parameter Type	String
DTMFDIGITS	54321
TIME	

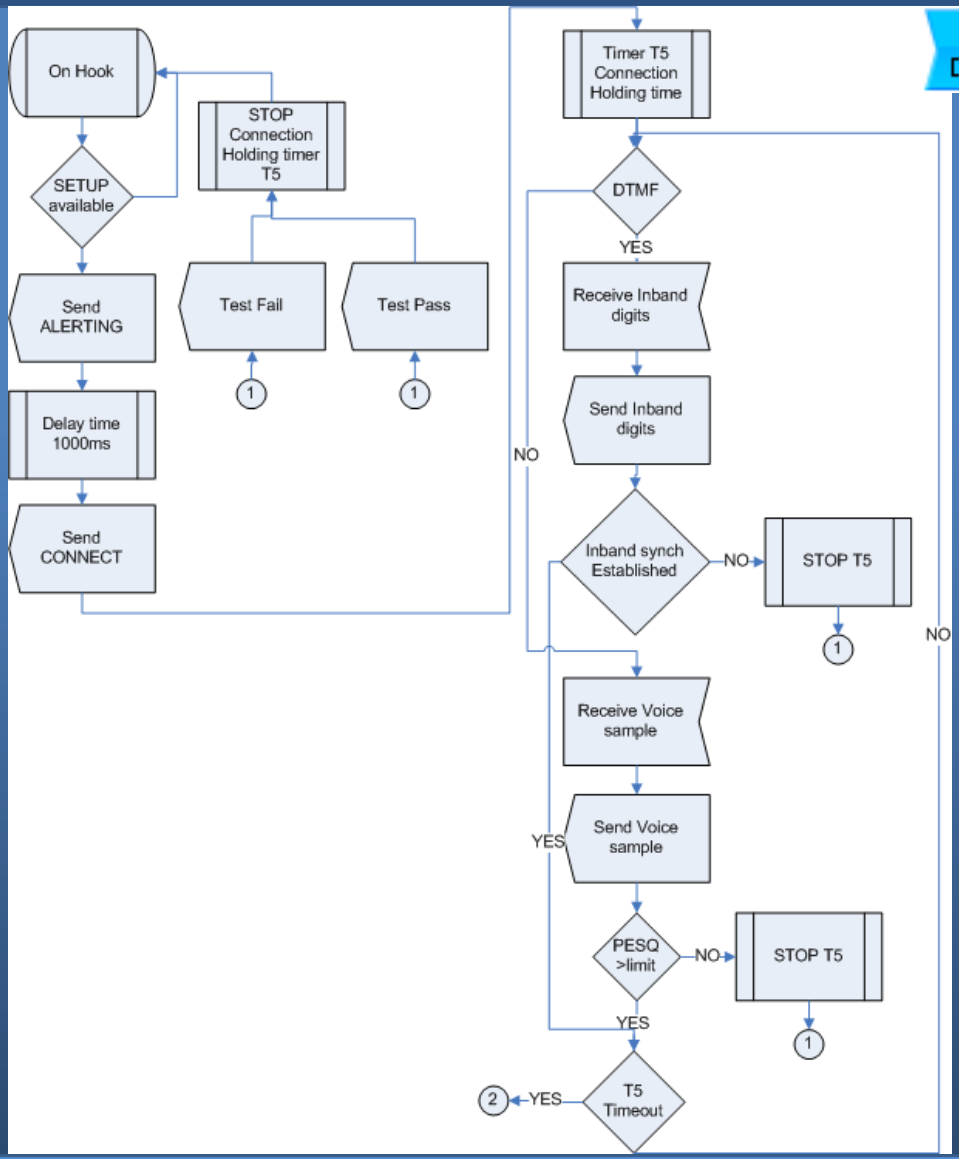
EndCall Properties

General Properties	
Enabled	
TIMEOUT	0
CAUSE	

Actions on an established call

ETSI TS186 025-2 v<2.0.12> Annex A.2.5

The call flow for the ISDN environment for voice calls called side



AC – Answer Call, will answer any incoming call, or will only answer calls addressed to a particular Called Party number.

RPTST – Repeat Start, can be used to configure how long the call will last for.

DTMFF – DTMF Find, will wait for a predefined string of DTMF digits.

DTMFS – DTMF Send, will send a string of DTMF digits during the call.

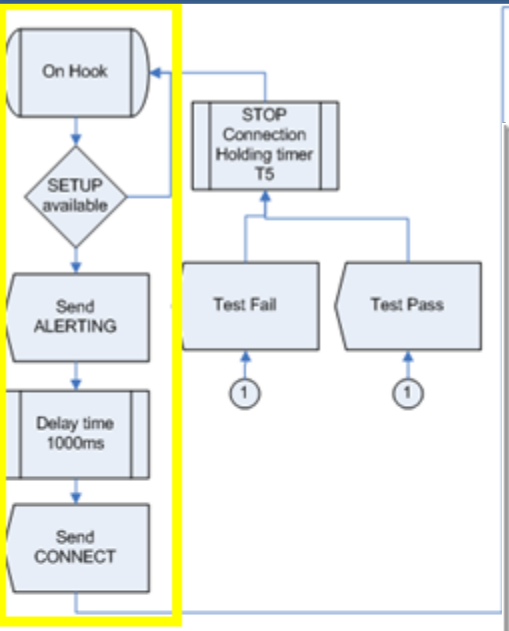
RPTND – Repeat End, the end of the repeat loop.

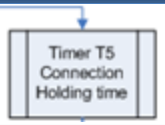
WFE – Wait for End, waits for the disconnect message from the network.

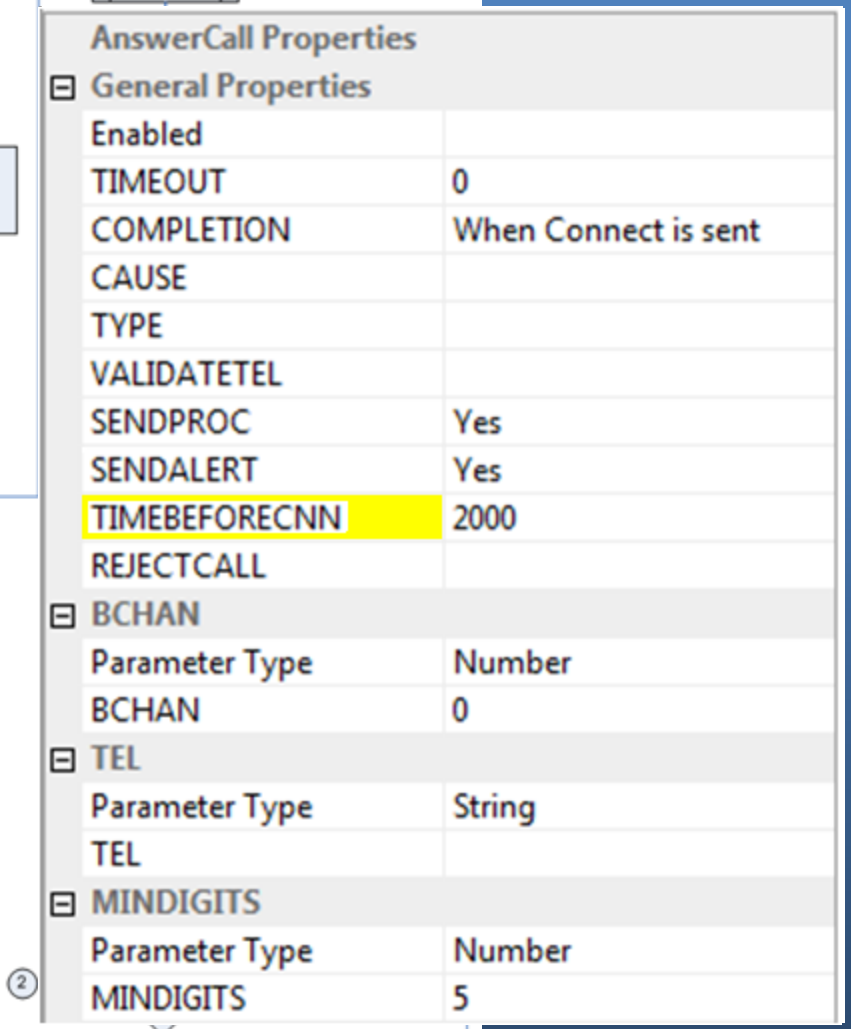
Call flow over view

ETSI TS186 025-2 v<2.0.12> Annex A.2.5

The call flow for the ISDN environment for voice calls called side







Completion – sets up when the call part should complete.

SENDPROC – sets up that call proceeding should be sent.

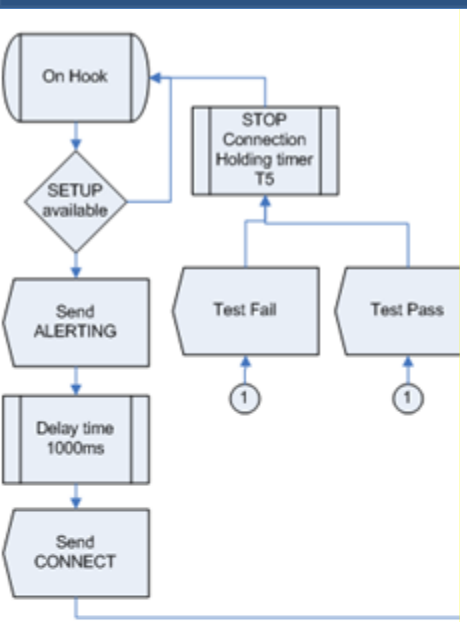
SENDALERT – sets up that alerting should be sent.

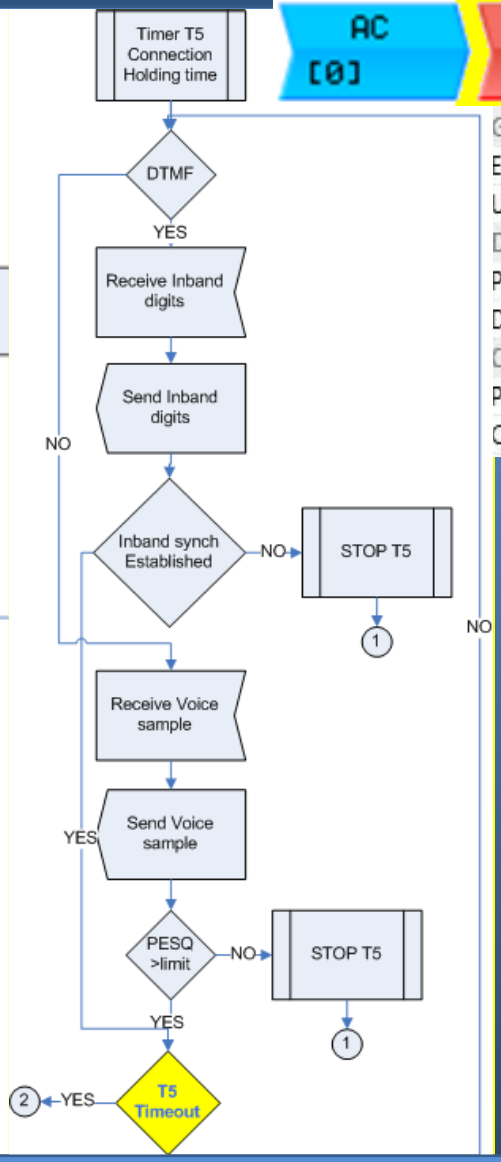
TIMEBEFORECNN – can be used to give a delay before sending the Connect message to the network, just like the delay in a user answering a call.

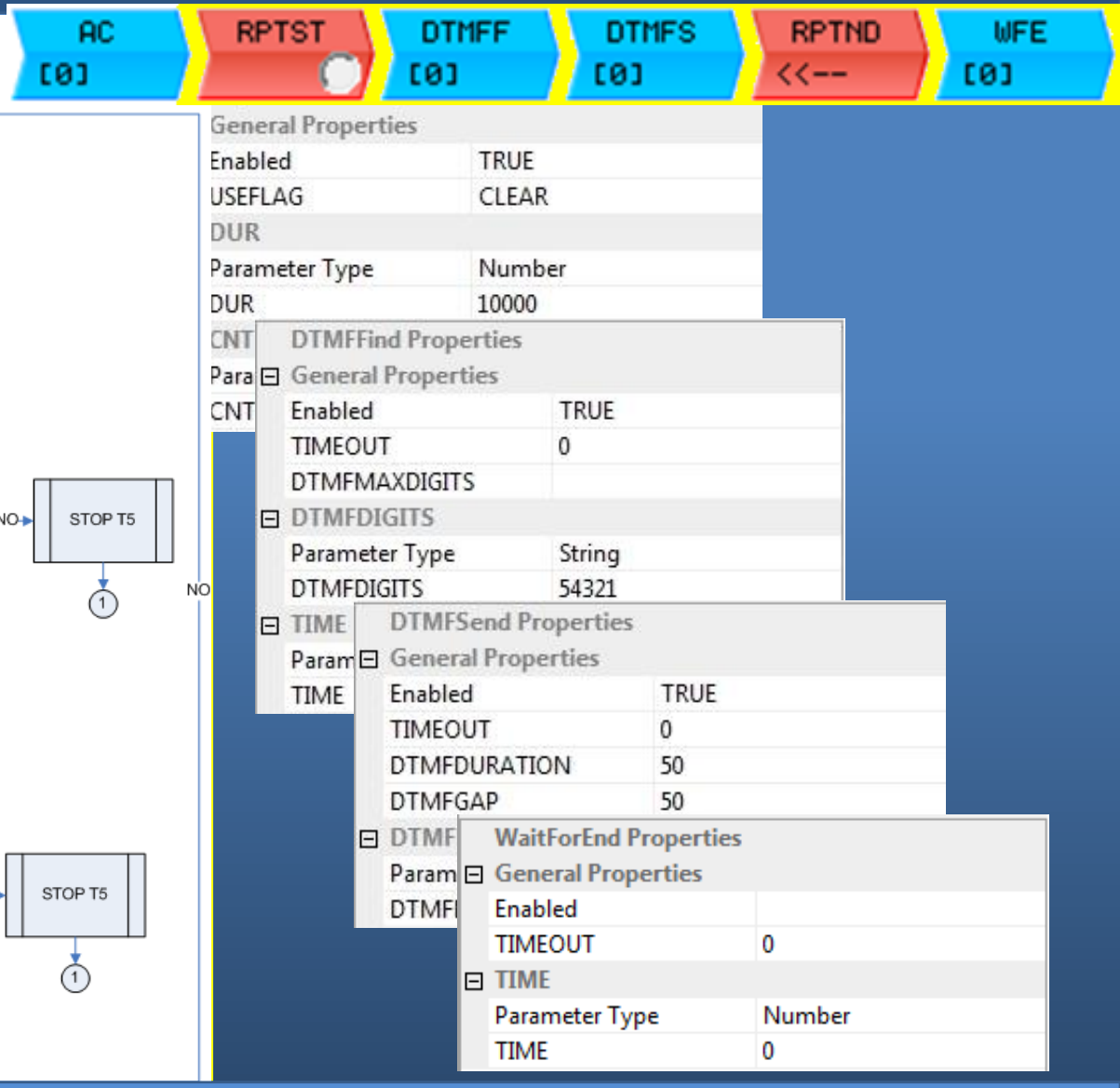
Answering an incoming call

ETSI TS186 025-2 v<2.0.12> Annex A.2.5

The call flow for the ISDN environment for voice calls called side







Actions on an established call

ETSI TS186 025-2 v<2.0.12>
Section 5 Use Cases

The emutel™ Harmony can be used to implement complete use cases.
Implementing both the calling user and the called user in the same script.

Receive call from the network
- ISDN (PRI, BRI-U, BRI-U)
- FXS
- SIP
- H.323

Make a call into the network
- ISDN (PRI, BRI-U, BRI-S)
- FXO
- SIP
- H.323

Telco Network

ISDN – ISDN Use Case 1

1.1 Basic call with bearer capability speech and enblock sending. The call is released from the calling user.

ACTIV – Activate BRI port

Delay – placed into script before MC to ensure AC is active and ready for an incoming call.

MC – Make call, transmit a setup request message into the network.

RPTST – Repeat Start, sets up how long the call should last for.

Delay – to ensure DTMFF on other side of the call is active. Short time, few ms

DTMFS – DTMF Send, transmits DTMF digits on the B-channel.

DTMFF – DTMF Find, looks for DTMF digits being sent on the B-channel.

RPTND – Repeat End, end of repeat loop.

EC – End Call, transmit a disconnect request message to the network.

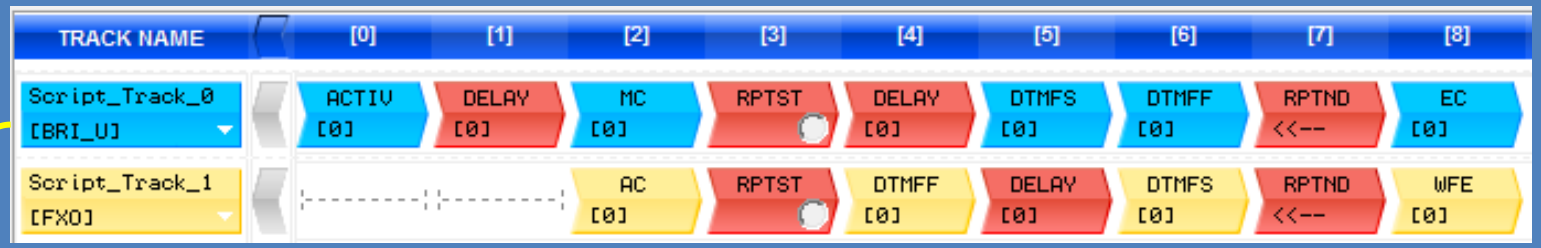
ISDN – ISDN Use Case 1

1.1 Basic call with bearer capability speech and enblock sending. The call is released from the calling user.

ACTIV – Activate BRI port.
AC – Answer call, reply to setup message from network.
RPTST – Repeat Start, sets up how long the call should last for.
DTMFF – DTMF Find, looks for DTMF digits being sent on the B-channel.
Delay – to ensure DTMFF on other side of the call is active. Short time, few ms
DTMFS – DTMF Send, transmits DTMF digits on the B-channel.
RPTND – Repeat End, end of repeat loop.
WFE – Wait for End, wait for disconnect message from network

ISDN – PSTN Use case 2

2.1 Basic call with bearer capability speech and enblock sending. The call is released from the calling user.



ACTIV – Activate BRI port

Delay – placed into script before MC to ensure AC is active and ready for an incoming call.

MC – Make call, transmit a setup request message into the network.

RPTST – Repeat Start, sets up how long the call should last for.

Delay – to ensure DTMFF on other side of the call is active. Short time, few ms

DTMFS – DTMF Send, transmits DTMF digits on the B-channel.

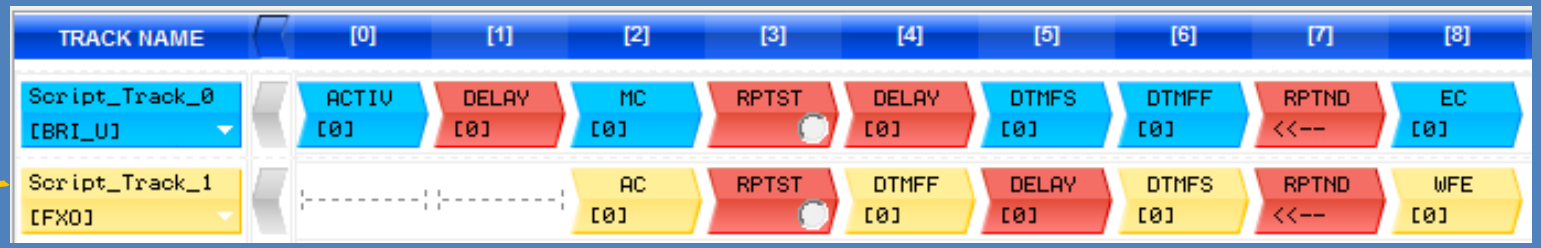
DTMFF – DTMF Find, looks for DTMF digits being sent on the B-channel.

RPTND – Repeat End, end of repeat loop.

EC – End Call, transmit a disconnect request message to the network.

ISDN – PSTN Use case 2

2.1 Basic call with bearer capability speech and enblock sending. The call is released from the calling user.

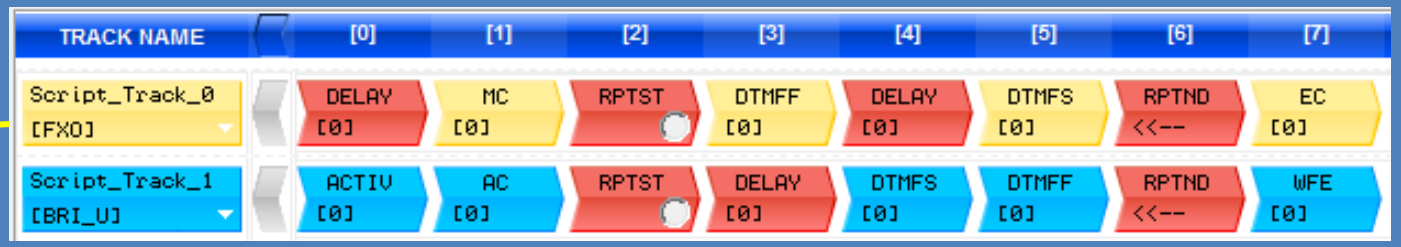


AC – Answer call, reply to setup message from network.
RPTST – Repeat Start, sets up how long the call should last for.
DTMFF – DTMF Find, looks for DTMF digits being sent on the B-channel.
Delay – to ensure DTMFF on other side of the call is active. Short time, few ms
DTMFS – DTMF Send, transmits DTMF digits on the B-channel.
RPTND – Repeat End, end of repeat loop.
WFE – Wait for End, wait for disconnect message from network

PSTN – ISDN Use case 3

3.1 Basic call. The call is released from the calling user.

The call is released from the calling user.



Delay – placed into script before MC to ensure AC is active and ready for an incoming call.

MC – Make call, transmit a setup request message into the network.

RPTST – Repeat Start, sets up how long the call should last for.

DTMFF – DTMF Find, looks for DTMF digits being sent on the B-channel.

Delay – to ensure DTMFF on other side of the call is active. Short time, few ms

DTMFS – DTMF Send, transmits DTMF digits on the B-channel.

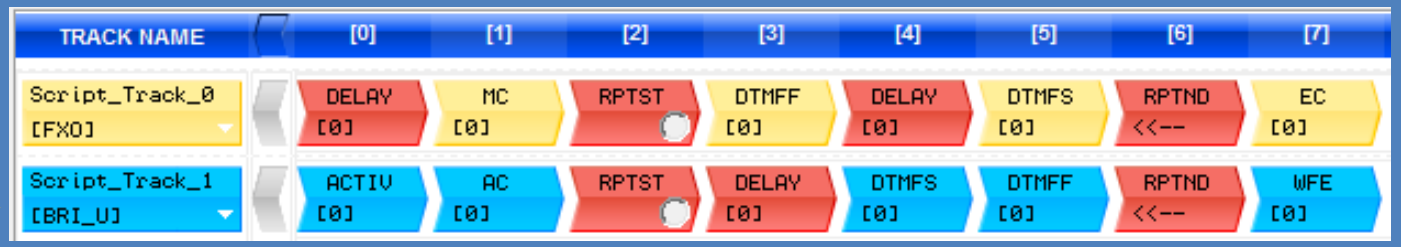
RPTND – Repeat End, end of repeat loop.

EC – End Call, transmit a disconnect request message to the network.

PSTN – ISDN Use case 3

3.1 Basic call. The call is released from the calling user.

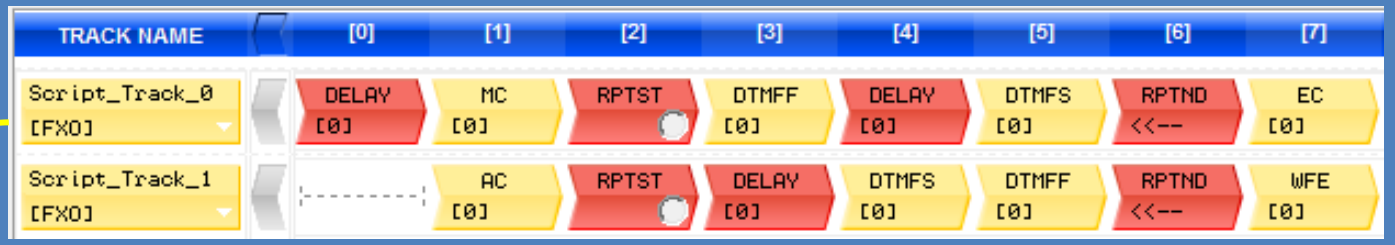
The call is released from the calling user.



ACTIV – Activate BRI port.
AC – Answer call, reply to setup message from network.
RPTST – Repeat Start, sets up how long the call should last for.
Delay – to ensure DTMFF on other side of the call is active. Short time, few ms
DTMFS – DTMF Send, transmits DTMF digits on the B-channel.
DTMFF – DTMF Find, looks for DTMF digits being sent on the B-channel.
RPTND – Repeat End, end of repeat loop.
WFE – Wait for End, wait for disconnect message from network

PSTN – PSTN Use case 4

4.1 Basic call. The call is released from the calling user.



Delay – placed into script before MC to ensure AC is active and ready for an incoming call.

MC – Make call, transmit a setup request message into the network.

RPTST – Repeat Start, sets up how long the call should last for.

DTMFF – DTMF Find, looks for DTMF digits being sent on the B-channel.

Delay – to ensure DTMFF on other side of the call is active. Short time, few ms

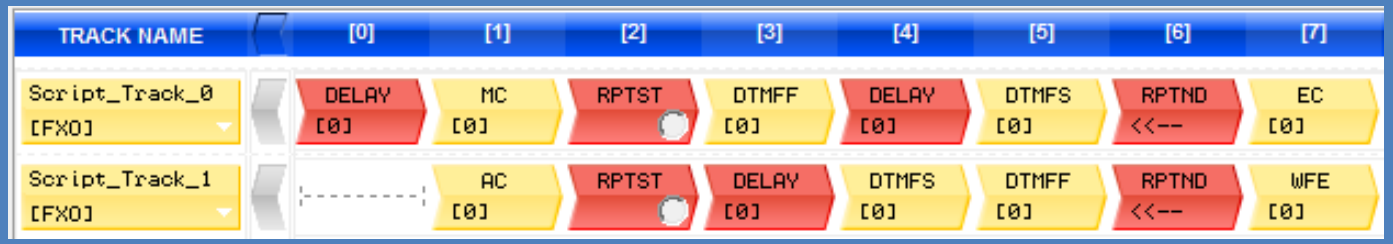
DTMFS – DTMF Send, transmits DTMF digits on the B-channel.

RPTND – Repeat End, end of repeat loop.

EC – End Call, transmit a disconnect request message to the network.

PSTN – PSTN Use case 4

4.1 Basic call. The call is released from the calling user.



AC – Answer call, reply to setup message from network.
RPTST – Repeat Start, sets up how long the call should last for.
DTMFF – DTMF Find, looks for DTMF digits being sent on the B-channel.
Delay – to ensure DTMFF on other side of the call is active. Short time, few ms
DTMFS – DTMF Send, transmits DTMF digits on the B-channel.
RPTND – Repeat End, end of repeat loop.
WFE – Wait for End, wait for disconnect message from network

Loading Profiles

The Harmony can be used for loading the system under test with a large number of calls.

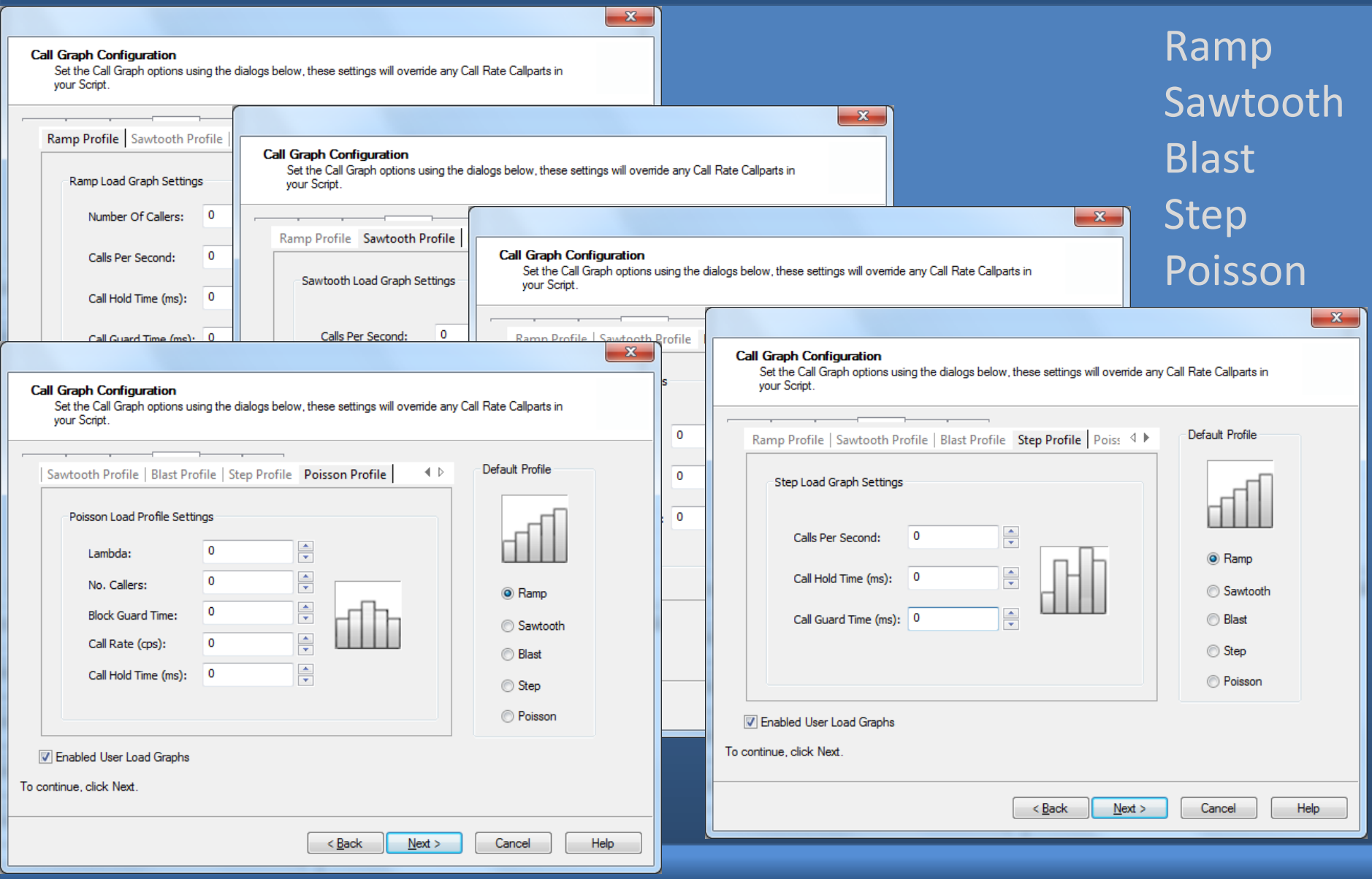
Calls can be make at various rates (Calls per Second)

Calls can vary in duration (Call Hold Time)

Calls can be made again after a period of time (Call Guard Time)

Different profiles can be used to load the system also

Loading Profiles



Ramp
Sawtooth
Blast
Step
Poisson

Test Reports

Reports can be generated for each test carried out on the Harmony.

Summary Reports –

- Calls Attempts
- Successful calls
- Failed calls
- Average call duration

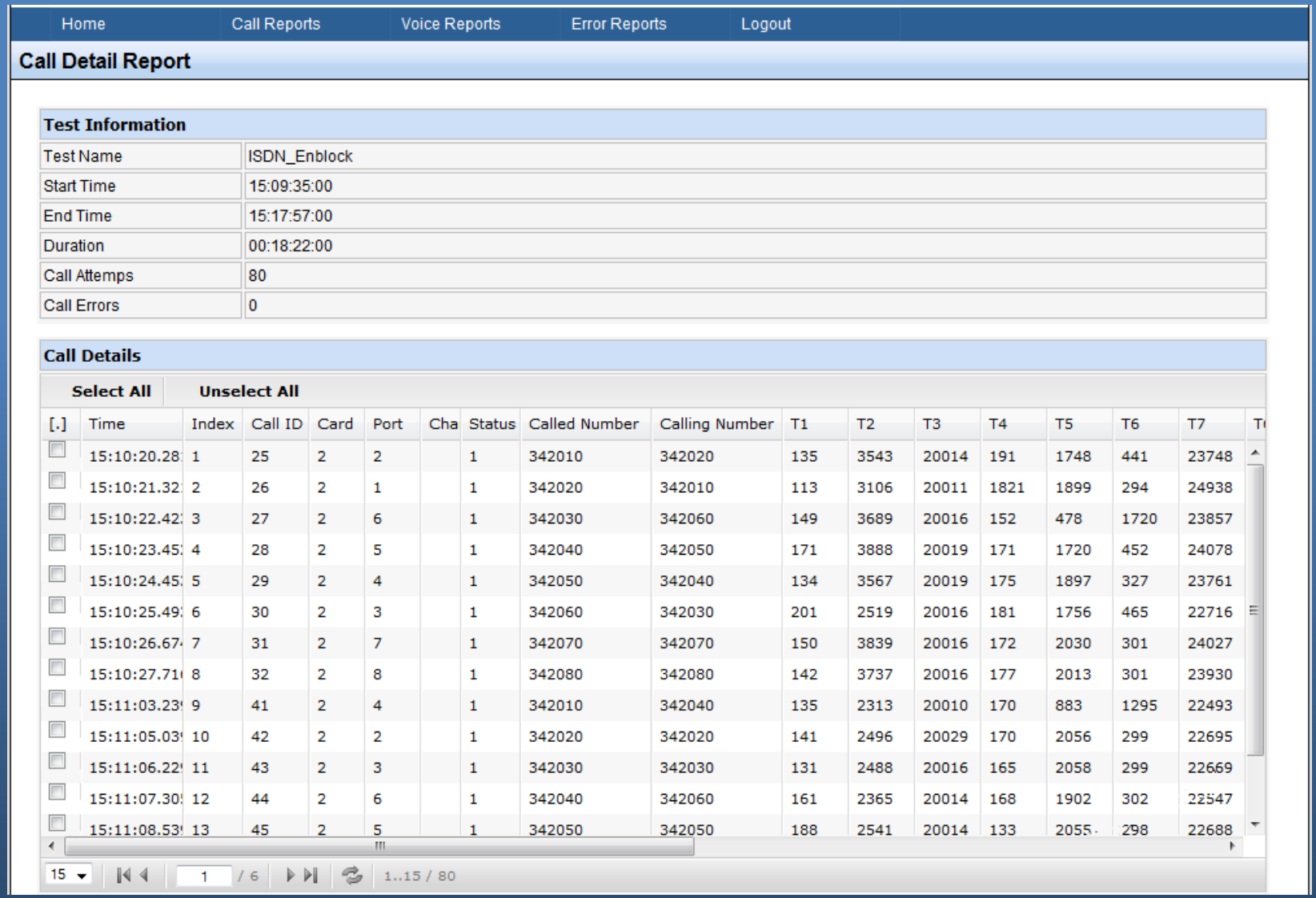
Detail Reports –

- Details of port used
- Called Party, Calling Party numbers
- Setup time
- Call duration
- Clear down times
- Setup through time, time for Setup message to be transmitted through system under test.

PESQ Reports –

- PESQ score
- Delay

Call Detail Reports



Home | Call Reports | Voice Reports | Error Reports | Logout

Call Detail Report

Test Information

Test Name	ISDN_Enblock
Start Time	15:09:35:00
End Time	15:17:57:00
Duration	00:18:22:00
Call Attemps	80
Call Errors	0

Call Details

Select All Unselect All

[.]	Time	Index	Call ID	Card	Port	Cha	Status	Called Number	Calling Number	T1	T2	T3	T4	T5	T6	T7	T
	15:10:20.28	1	25	2	2		1	342010	342020	135	3543	20014	191	1748	441	23748	
	15:10:21.32	2	26	2	1		1	342020	342010	113	3106	20011	1821	1899	294	24938	
	15:10:22.42	3	27	2	6		1	342030	342060	149	3689	20016	152	478	1720	23857	
	15:10:23.45	4	28	2	5		1	342040	342050	171	3888	20019	171	1720	452	24078	
	15:10:24.45	5	29	2	4		1	342050	342040	134	3567	20019	175	1897	327	23761	
	15:10:25.49	6	30	2	3		1	342060	342030	201	2519	20016	181	1756	465	22716	
	15:10:26.67	7	31	2	7		1	342070	342070	150	3839	20016	172	2030	301	24027	
	15:10:27.71	8	32	2	8		1	342080	342080	142	3737	20016	177	2013	301	23930	
	15:11:03.23	9	41	2	4		1	342010	342040	135	2313	20010	170	883	1295	22493	
	15:11:05.03	10	42	2	2		1	342020	342020	141	2496	20029	170	2056	299	22695	
	15:11:06.22	11	43	2	3		1	342030	342030	131	2488	20016	165	2058	299	22669	
	15:11:07.30	12	44	2	6		1	342040	342060	161	2365	20014	168	1902	302	22547	
	15:11:08.53	13	45	2	5		1	342050	342050	188	2541	20014	133	2055	298	22688	

15 | 1 / 6 | 1..15 / 80

Pesq Reports

Home | Call Reports | Voice Reports | Error Reports | Logout

Voice PESQ Report

Test Information	
Test Name	ISDN_Pesq
Start Time	10:09:42:00
End Time	10:13:10:00
Duration	00:04:32:00
Call Attemps	10
Call Errors	0

PESQ Detail Report [1-10] out of [10]

Index	Channel	PESQ Score	PESQ Mos	PESQ Noise	PESQ Speech	PESQ Mos P800	PESQ Mos LQ	PESQ Average Delay
1	4	4.4711	4.5311	4.4651	4.5000	4.9670	4.4872	3.875
2	5	4.1723	4.3129	4.4984	4.0107	4.6255	4.2886	0.75
3	7	4.4951	4.5457	4.4988	4.4924	4.9944	4.4979	12.75
4	9	4.4127	4.4938	4.4731	4.3666	4.9002	4.4577	0.875
5	11	4.4448	4.5146	4.4983	4.4123	4.9369	4.4745	1
6	13	4.4753	4.5337	4.4711	4.4919	4.9717	4.4891	0.875
7	15	4.3220	4.4309	4.4983	4.2438	4.7966	4.4027	1
8	17	4.4998	4.5485	4.4977	4.4997	4.9998	4.4999	4.375
9	19	4.4746	4.5332	4.4724	4.4839	4.9710	4.4888	1
10	21	4.4690	4.5298	4.4972	4.4509	4.9646	4.4862	0.875

QUESTIONS

arcatech Ltd
www.arcatech.com
sales@arcatech.com
+44 (0)28 92 677 204