Measuring Tetra Performance with the In-Field Performance Measurement Tool (IFPM)

Tetra Applications

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IFPM Overview

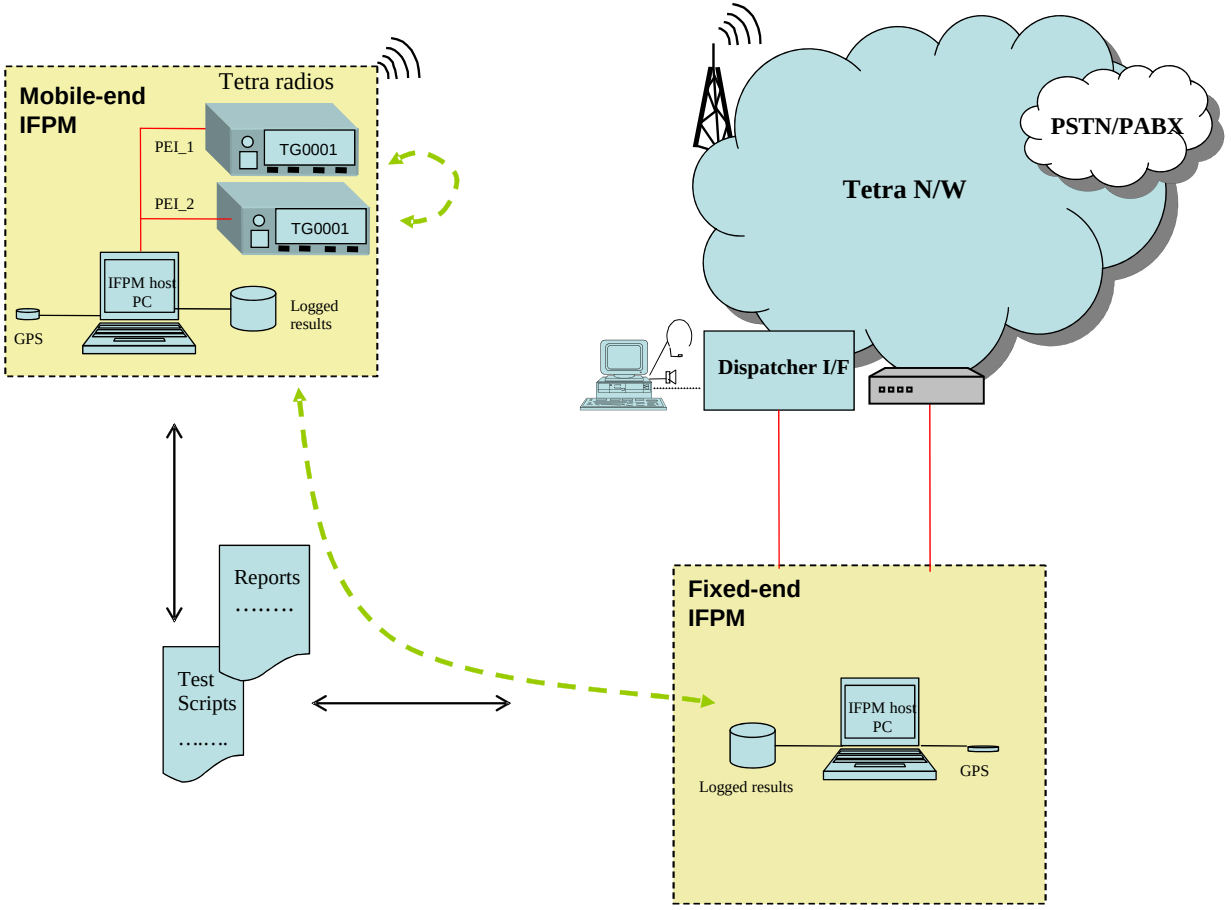
- Engineering test tool to capture network & terminal information
- Used to demonstrate/prove performance & Quality of Service
- Scripted control – repeatable, accurate
- Tailored reports generated from analysis of logged data

IFPM Principles

- IFPM tool logs parameters for:
  - Voice services (Group, P2P, Telephony)
  - Data services (Emergency, Status, SDS & Packet data)

  Plus
  - All timing, location, events and actions
- Resultant reports verify performance e.g.
  - Call/service set-up times
  - End-to-end delays
  - Quality, Accuracy and Success

IFPM Architecture



Example Test Scenarios

Voice

Data

Scenario ID	Category	Type	Description	Time per call	Calls per location
V1	Voice	Group mobile & fixed	• Call setup from mobile end. • One 15 second voice sample sent from mobile to fixed end.	60s	100
V2	Voice	Group mobile & fixed	• Call setup from fixed end. • One 15 second voice sample sent from to fixed to mobile end.	60s	100
V3	Voice	P2P	• Call setup from mobile to fixed end. • One 15 second voice sample sent from fixed to mobile end. • Call cleared at mobile end.	60s	100
V4	Voice	P2P	• Call setup from fixed to mobile end. • One 15 second voice sample sent from to mobile to fixed end. • Call cleared at fixed end.	60s	100
V5	Voice	PSTN; MSISDN	• Call setup from mobile A to mobile B. • One 15 second voice sample sent from to mobile B to mobile A. • Call cleared at mobile A.	60s	50
V6	Voice	PTN	• Call setup from mobile end to PABX extension. • One 15 second voice sample sent from mobile end to telephone extension. • Call cleared at mobile end.	60s	50
V7	Voice	PTN	• Call setup from PABX extension to mobile end. • One 15 second voice sample sent from mobile end to telephone extension. • Call cleared at PABX.	60s	50
D1	Data	SDS type 4	Variable messages (max 127 characters) sent from mobile to fixed end.	5s	400
D2	Data	SDS type 4	Variable messages (max 127 characters) sent from fixed to mobile end.	5s	400
D3	Data	SDS type 4 failed delivery	Variable messages (max 127 characters) sent from fixed to mobile end while mobile end is powered down.	5s	100
D4	Data	Status	Variable messages sent from mobile to fixed end.	5s	400
D5	Data	Packet data	IP data message of < 4096bits in length sent from mobile to fixed end	20s	100
D6	Data	Packet data	IP data message of < 4096bits in length sent from fixed to mobile end.	20s	100

Syntech SYSTEMS

Scripts Logs & Records

```
START_PROGRAM_MOBILE
 Change_log_file
//-----------------------------
// Assign variables
//-----------------------------
 assign test_talkgroup 1234567
 assign CommandWait 500
 assign numRepeatsB 100
 assign minStatusValue 33001
 assign sdsWait 5000
 wait_until "**:**:30"
// ----------------------------
// get radio status
// ----------------------------
GET_MANUFACTURE
wait CommandWait
GET_PRODUCT_ID
wait CommandWait
GET_SOFT_REV
wait CommandWait
Get_ITSI
wait CommandWait
GET_NEIGH_CELL
wait CommandWait
GET_REG_STATUS
wait CommandWait
GET_SERV_CELL
wait CommandWait
GET_SIG_QUALITY
wait CommandWait
// ----------------------------
// prepare terminal...
// ----------------------------
 SELECT_TALKGROUP test_talkgroup
// ----------------------------
// test loop
// ----------------------------
 assign repeatCount 0
 while repeatCount < numRepeatsB
  Add repeatCount 1
  PRINT "  Mobile sets up group call #" repeatCount
  Wait_Until "**:**:00"
```

example result log - Notepad

File Edit Format View Help

```
SER,30/11/2006,17:18:03.093,0.000,Version = 1.2
SPT <-> (Port 13),30/11/2006,17:18:03.146,0.000,assign 8292010 8292010
GPS (Port 01),30/11/2006,17:19:08.320,0.000,GPS STATUS : GPS in fix
SPT <-> (Port 13),30/11/2006,17:19:05.069,0.000,DSLA_PLAY "C:\Program Files\MultiDSLA\Tasklists\User Taskl
SPT <-> (Port 13),30/11/2006,17:18:03.645,0.000,assign CommandWait 500
SPT <-> (Port 13),30/11/2006,17:18:03.707,0.000,assign numRepeatsA 50
SPT <-> (Port 13),30/11/2006,17:18:03.898,0.000,assign minStatusValue 29000
DSL,30/11/2006,17:19:05.069,0.000,TEST SCHEDULE C:\Program Files\MultiDSLA\Tasklists\User Tasklists\IFPM
DSL,30/11/2006,17:19:05.119,0.000,2188DSL,30/11/2006,17:19:05.119,0.000,DSLA STATUS : DSLA in test
SPT <-> (Port 13),30/11/2006,17:19:05.131,0.000,wait_until "**:**:26"
GPS (Port 01),30/11/2006,17:19:08.320,0.000,GPS STATUS : GPS in fix
GPS (Port 01),30/11/2006,17:19:08.000,0.000,$GPGGA,17188,5137.4707,N,00018.4307,E,2,07,1.3,97.8,M,47.0,M,
RAD --> (Port 13),30/11/2006,17:19:08.484,68.490,C7060001303139315 46F74616C206D65737361676 5206C656E
GPS (Port 01),30/11/2006,17:19:09.167,0.000,GPS STATUS : GPS in fix
GPS (Port 01),30/11/2006,17:19:10.000,0.000,$GPGGA,171825137.4707,N,00018.4308,E,2,07,1.3,97.6,M,47.0,M,,
DSL,30/11/2006,17:19:11.244,0.000,RUNNINGDSL,30/11/2006,17:19:11.244,0.000,DSLA STATUS : DSLA idle
GPS (Port 01),30/11/2006,17:19:11.319,0.000,GPS STATUS : GPS in fix
DSL,30/11/2006,17:19:21.251,0.000,FINISHEDRAD --> (Port 13),30/11/2006,17:19:24.749,13.830,+CTSDSR: 12,2
RAD --> (Port 13),30/11/2006,17:19:24.797,68.490,C70600013031393354 6F74616C206D65737361676 5206C656E
RAD <-- (Port 13),30/11/2006,17:19:26.009,3.125,AT+CUTXC=42
SPT <-> (Port 13),30/11/2006,17:19:26.068,0.000,End_While
SPT <-> (Port 13),30/11/2006,17:19:26.130,0.000,while repeatCount < 10
RAD --> (Port 13),30/11/2006,17:19:26.141,3.385,+CDTXC: 42,0
GPS (Port 01),30/11/2006,17:19:26.181,0.000,GPS STATUS : GPS in fix
```

IFPM Tool Reporting - (c) Syntech Systems Ltd - Release 17.0

Please enter the log files you wish to process in the boxes below. You can either enter one log file for the Mobile Unit and one log file for the Fixed Unit or, if you are processing the results of a Mobile-Mobile test, you need only enter the log file for the Mobile Unit. You cannot enter a Fixed Unit log file without a Mobile Unit log file.

Click "Process" when you have entered all the log files

One way USB-RS232 Converter Delay 8 ms

MOBILE UNIT LOG FILES (2 x Terminals Used)

Mobile.log Browse

FIXED UNIT LOG FILES (Fixed Unit is Mobile IFPM)

Fixed.log Browse

GSSI

Fixed ISSI (Group)

Fixed ISSI (P2P)

Fixed ISSI (SDS)

Process

Terminal 1 MSISDN

Terminal 2 MSISDN

Fixed Telephone

PTN/PSTN Calls PTN PSTN

Repeat

Clear All

Mobile IP Address

Fixed IP Address

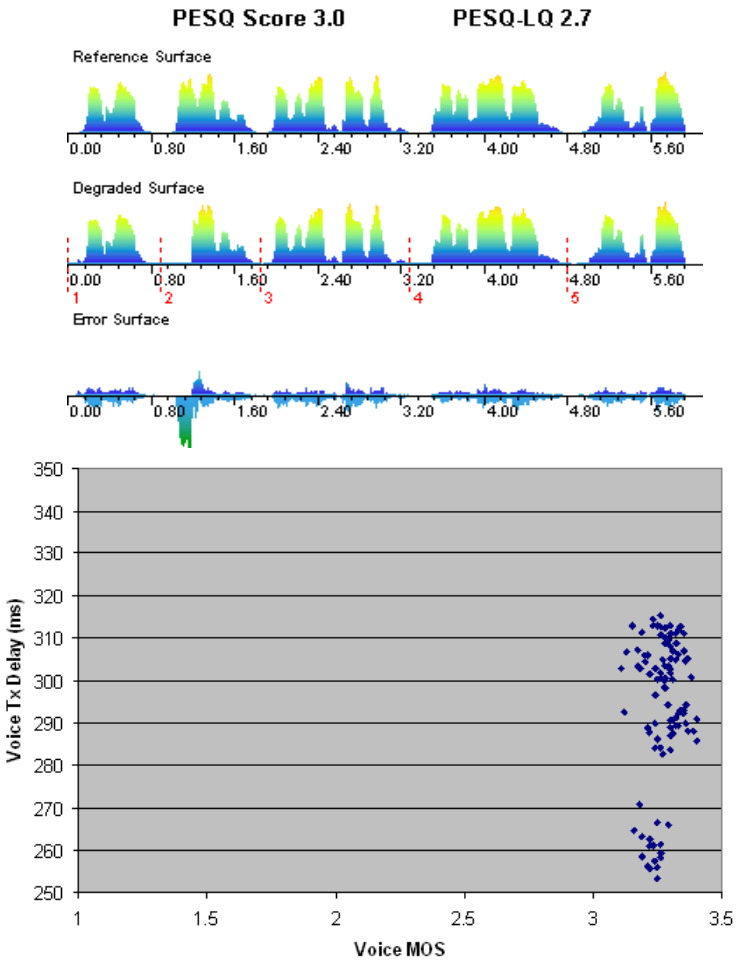
Cancel

	A	B	C	D															
1	CDR_Number_Unique	Call_CDR	Transmission_CDR	Direction	Sending	Receivi	Rec	N	nu	PESQ	Delay	Level	Peak	Tcommand	ms	TAction	msA	TTestStart	m
2	17012008120005129Mobile 1	1.7012E+23	1701200812000529409705983	Mobile-Fixed	Mobile 1	Fixed 1	2	0	0	2.71	263.98	-46.8	-23.33	#2008-01-17 12:00:05#	129	#2008-01-17 12:00:05#	129	#2008-01-17 12:00:08#	1
3	17012008120035127Mobile 1	1.7012E+23	1701200812003527009705983	Mobile-Fixed	Mobile 1	Fixed 1	2	0	0	2.71	264	-46.8	-22.24	#2008-01-17 12:00:35#	127	#2008-01-17 12:00:35#	127	#2008-01-17 12:00:38#	1
4	17012008120105130Mobile 1	1.7012E+23	1701200812010530409705983	Mobile-Fixed	Mobile 1	Fixed 1	2	0	0	2.73	268.1	-46.2	-22.18	#2008-01-17 12:01:05#	130	#2008-01-17 12:01:05#	130	#2008-01-17 12:01:08#	1
5	17012008120135129Mobile 1	1.7012E+23	1701200812013533809705983	Mobile-Fixed	Mobile 1	Fixed 1	2	0	0	2.76	264.91	-47.45	-22.13	#2008-01-17 12:01:35#	129	#2008-01-17 12:01:35#	129	#2008-01-17 12:01:38#	1
6	17012008120205128Mobile 1	1.7012E+23	1701200812020525809705983	Mobile-Fixed	Mobile 1	Fixed 1	2	0	0	2.73	269.25	-47.09	-22.65	#2008-01-17 12:02:05#	128	#2008-01-17 12:02:05#	128	#2008-01-17 12:02:08#	1
7	17012008121605129Mobile 1	1.7012E+23	1701200812160528509705983	Mobile-Fixed	Mobile 1	Fixed 1	2	0	0	2.7	262.64	-46.52	-22.04	#2008-01-17 12:16:05#	129	#2008-01-17 12:16:05#	129	#2008-01-17 12:16:08#	4
8	17012008121635128Mobile 1	1.7012E+23	1701200812163526109705983	Mobile-Fixed	Mobile 1	Fixed 1	2	0	0	2.61	265.33	-46.82	-22.5	#2008-01-17 12:16:35#	128	#2008-01-17 12:16:35#	128	#2008-01-17 12:16:38#	4
9	17012008121705126Mobile 1	1.7012E+23	1701200812170529409705983	Mobile-Fixed	Mobile 1	Fixed 1	2	0	0	2.81	268.48	-47.37	-22.92	#2008-01-17 12:17:05#	126	#2008-01-17 12:17:05#	126	#2008-01-17 12:17:08#	4
10	17012008121735126Mobile 1	1.7012E+23	1701200812173527009705983	Mobile-Fixed	Mobile 1	Fixed 1	2	0	0	2.67	265.95	-46.55	-21.76	#2008-01-17 12:17:35#	126	#2008-01-17 12:17:35#	126	#2008-01-17 12:17:38#	4
11	17012008121805127Mobile 1	1.7012E+23	1701200812180530409705983	Mobile-Fixed	Mobile 1	Fixed 1	2	0	0	2.69	267.56	-46.63	-21.08	#2008-01-17 12:18:05#	127	#2008-01-17 12:18:05#	127	#2008-01-17 12:18:08#	4
12	17012008121835126Mobile 1	1.7012E+23	1701200812183528009705983	Mobile-Fixed	Mobile 1	Fixed 1	2	0	0	2.75	268.95	-46.9	-22.81	#2008-01-17 12:18:35#	126	#2008-01-17 12:18:35#	126	#2008-01-17 12:18:38#	4
13	17012008121905127Mobile 1	1.7012E+23	1701200812190525809705983	Mobile-Fixed	Mobile 1	Fixed 1	2	0	0	2.73	269.73	-46.51	-21.32	#2008-01-17 12:19:05#	127	#2008-01-17 12:19:05#	127	#2008-01-17 12:19:08#	4
14	17012008121935126Mobile 1	1.7012E+23	1701200812193529109705983	Mobile-Fixed	Mobile 1	Fixed 1	2	0	0	2.65	261.06	-46.5	-23.34	#2008-01-17 12:19:35#	126	#2008-01-17 12:19:35#	126	#2008-01-17 12:19:38#	5
15	17012008122005128Mobile 1	1.7012E+23	1701200812200526809705983	Mobile-Fixed	Mobile 1	Fixed 1	2	0	0	2.66	267.68	-47.09	-21.84	#2008-01-17 12:20:05#	128	#2008-01-17 12:20:05#	128	#2008-01-17 12:20:08#	
16	17012008122035126Mobile 1	1.7012E+23	1701200812203530009705983	Mobile-Fixed	Mobile 1	Fixed 1	2	0	0	2.73	264.5	-46.44	-22.05	#2008-01-17 12:20:35#	126	#2008-01-17 12:20:35#	126	#2008-01-17 12:20:38#	
17	17012008122105127Mobile 1	1.7012E+23	1701200812210527709705983	Mobile-Fixed	Mobile 1	Fixed 1	2	0	0	2.76	267.31	-46.86	-21.22	#2008-01-17 12:21:05#	127	#2008-01-17 12:21:05#	127	#2008-01-17 12:21:08#	
18	17012008122135128Mobile 1	1.7012E+23	1701200812213531009705983	Mobile-Fixed	Mobile 1	Fixed 1	2	0	0	2.69	263.27	-47.25	-21.64	#2008-01-17 12:21:35#	128	#2008-01-17 12:21:35#	128	#2008-01-17 12:21:38#	
19	17012008122205128Mobile 1	1.7012E+23	1701200812220528709705983	Mobile-Fixed	Mobile 1	Fixed 1	2	0	0	2.72	266.83	-46.92	-21.55	#2008-01-17 12:22:05#	128	#2008-01-17 12:22:05#	128	#2008-01-17 12:22:08#	
20	17012008122235128Mobile 1	1.7012E+23	1701200812223526409705983	Mobile-Fixed	Mobile 1	Fixed 1	2	0	0	2.7	263.12	-46.86	-20.7	#2008-01-17 12:22:35#	128	#2008-01-17 12:22:35#	128	#2008-01-17 12:22:38#	
21	17012008122305127Mobile 1	1.7012E+23	1701200812230529809705983	Mobile-Fixed	Mobile 1	Fixed 1	2	0	0	2.68	268.06	-46.97	-22.36	#2008-01-17 12:23:05#	127	#2008-01-17 12:23:05#	127	#2008-01-17 12:23:08#	
22	17012008122335127Mobile 1	1.7012E+23	1701200812233527309705983	Mobile-Fixed	Mobile 1	Fixed 1	2	0	0	2.71	271.17	-46.98	-22.59	#2008-01-17 12:23:35#	127	#2008-01-17 12:23:35#	127	#2008-01-17 12:23:38#	
23	17012008122405126Mobile 1	1.7012E+23	1701200812240530709705983	Mobile-Fixed	Mobile 1	Fixed 1	2	0	0	2.69	267.48	-47.1	-21.52	#2008-01-17 12:24:05#	126	#2008-01-17 12:24:05#	126	#2008-01-17 12:24:08#	
24	17012008122435127Mobile 1	1.7012E+23	1701200812243528409705983	Mobile-Fixed	Mobile 1	Fixed 1	2	0	0	2.67	264.43	-46.79	-21.74	#2008-01-17 12:24:35#	127	#2008-01-17 12:24:35#	127	#2008-01-17 12:24:38#	

Performance Reporting (1)

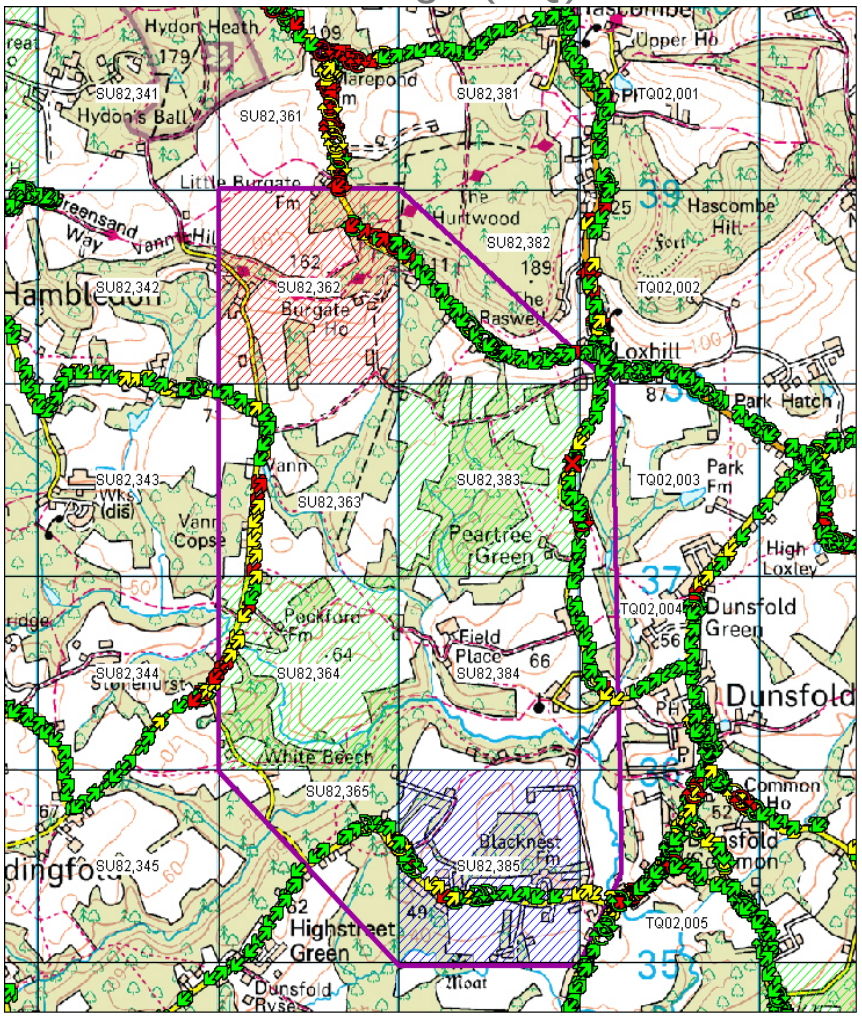
Voice quality & transmission delay

Voice Call Transmission Delay (PESQ > 2.5)				
Location/Route		**Date:**		
Test ID	**Call Category & Type**	**Limits (mS)**	**Target Percentage**	**Measured Percentage**
V1, V4	Voice (group or P2P) call from mobile end	350	50	
	Same Zone. Number of calls attempted -	410	95	
	Voice (group or P2P) call from mobile end	615	50	
	Different Zone. Number of calls attempted -	705	95	
V2, V3	Voice (group or P2P) call from fixed end	295	50	
	Same Zone. Number of calls attempted -	330	95	
V5	PSTN call from mobile end	310	50	
	Same Zone. Number of calls attempted -	345	95	
	PSTN call from mobile end	1,500	95	
	Different Zone. Number of calls attempted -			
V6, V7	PTN call from mobile or PTN end	350	50	
	Same Zone. Number of calls attempted -	410	95	
	PTN call from mobile or PTN end	1,500	95	
	Different Zone. Number of calls attempted -			

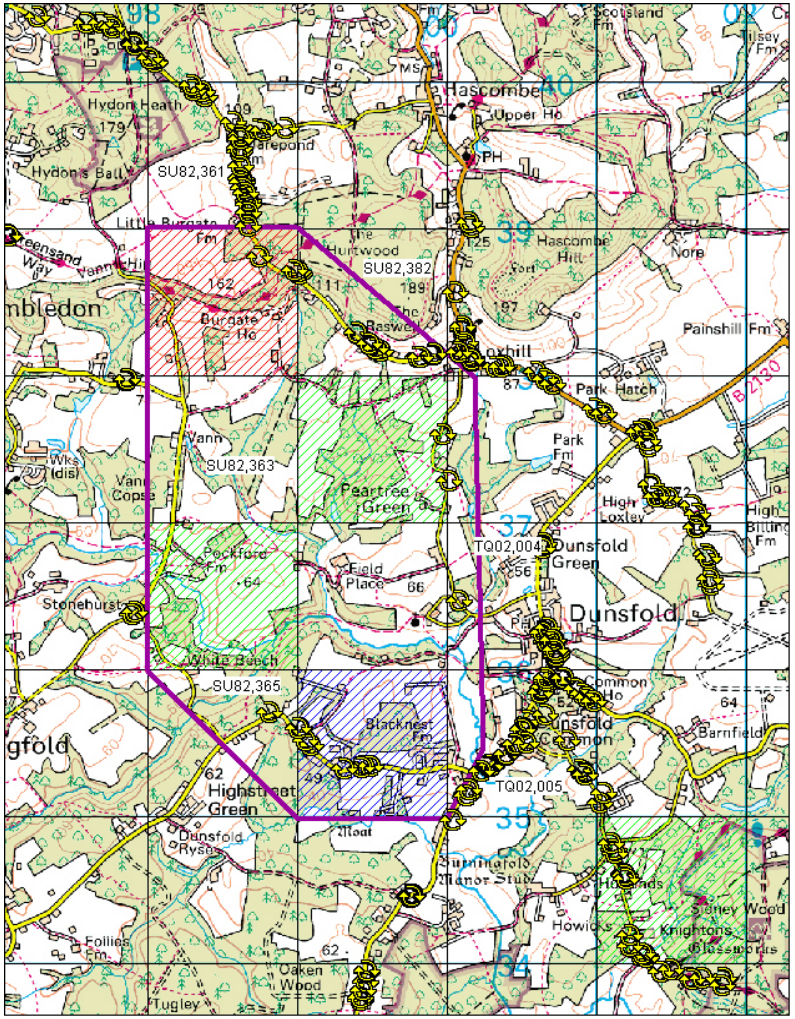


Performance Reporting (2)

Coverage (VQ)

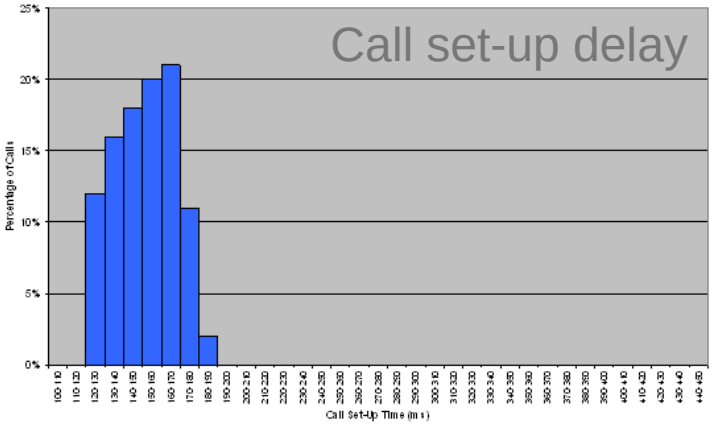


Handovers

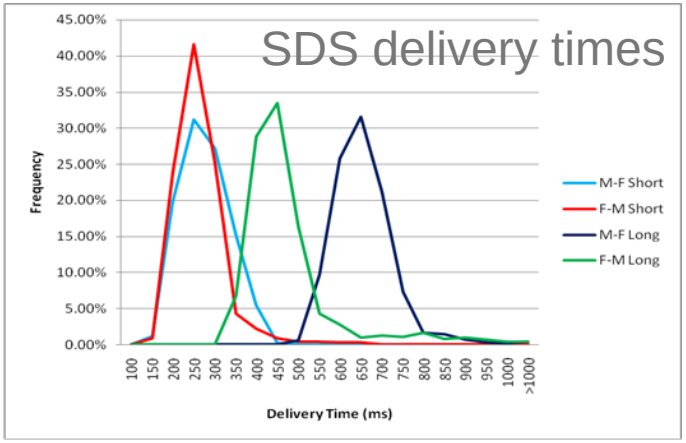


Performance Reporting (3)

Voice Call Set Up Delay				
Location/Route	Fire control	Date:	01/01/07	
Test ID	Call Category & Type	Limits (mS)	Target Percentage	Measured Percentage
V1	Voice group call from mobile end.	350	48	
	Number of calls attempted - 100	600	93	
		3,000	96.6	
V2	Voice group call from fixed end.	350	48	
	Number of calls attempted - 100	600	93	
		3,000	96.6	
V3	Point to point call from mobile end.	1,000	93	
	Number of calls attempted - 100	3000	96.6	
V4				
V5				
V6				
V7				



Data transmission Delay (Success Rate)				
Location/Route		Date:		
Test ID	Call Category & Type	Limits (mS)	Target Percentage	Measured Percentage
D1	SDS Type 4 - mobile to fixed end	1,000	50	
	Number of calls attempted -	5,000	97.7	
D2	SDS Type 4 - fixed to mobile end	1,000	50	
	Number of calls attempted -	5,000	97.7	
D3	SDS Type 4 - fixed to "off" mobile, failure report	NA	NA	NA
	Number of calls attempted -	NA	NA	NA
D4	Status - mobile to fixed end	1,600	50	
	Number of calls attempted -	4,000	90	
D5	IP data - mobile to fixed end	2,000	50	
	Number of calls attempted -	10,000	95	
D6	IP data - fixed to mobile end	2,000	50	
	Number of calls attempted -	10,000	95	



IFPM Applications

- Coverage: Drive/Walk testing
- Verifying network performance
- Load traffic generation
- Terminal comparison
- Scenario testing, Fault investigation
- Used at Network Operator reference systems

IFPM key features

- Calibrated voice quality ITU 862.1 (PESQ)
- Accurate timing (ms)
- Supports all Tetra services
- Fixed or mobile units for true end-end testing
- Supports different terminal equipment
- Multiple uses –
  - verifying SLA (e.g coverage, performance, QoS)
  - Investigating faults or issues
  - Traffic/load generator
- Field-proven over several years

Thank You

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