

# ANRITSU NETCLAW FINDING NEEDLE IN A HAYSTACK: ENABLING OPERATORS TO FIND PROBLEM CALLS IN NETWORK

### Introduction

As PSTN networks increase in complexity with dozens of vendor equipment, multiple protocols and complex interfaces, the troubleshooting complexity also increases for network personal. Coupled with rising cost cutting at network operators leaving fewer in-house experts to troubleshoot and deal with complex problems, wire line operators typically have to look at hundreds of calls before they are able to find a particular call with a problem. NetClaw is Anritsu's powerful network and service analyzer which allows operators and vendors to quickly identify and troubleshoot a particular call instead of looking at hundreds of calls and spending countless man hours in debugging and troubleshooting.

### Troubleshooting problem calls challenge

Most network protocol analyzer in the markets had traditionally been split either into protocol analyzers or in traffic generators. There has been not a single instrument which could bridge the gap between protocol analysis and the need to look at individual user phone calls at one time.

NetClaw is the first instrument which addresses both needs very well. It can perform a protocol analyzer function and also the functions for a network analyzer simultaneously. To ease these tasks the Anritsu NetClaw offers an intuitive and flexible solution via its sequencer function. The sequencer allows automatic tracing of transactions, calls and sessions in a SS7 network with the added benefit of embracing both VoIP and SS7 signaling for crossdomain analysis. This makes it easy to find problems related to failed calls, problems with specific user agents, and interoperability issues between soft switches and media gateways. With the NetClaw sequencer, first line support may use call trace to document if a customer does indeed have a problem, or whether the problem is related to network issues or the subscription. Second and third line support may use the NetClaw sequencer function to find the cause of the problem.

### Troubleshooting live calls in live networks

A US facilities-based telecommunications services provider with a substantial customer base in the residential and commercial market segments, operating an extensive network with three switch locations, wanted to see details of particular calls from certain phone numbers (MSISDNs) in greater detail. The service provider was also interested to see both sides of a SS7 call. Calls going into the service provider's SS7 switch and exiting his SS7 switch at the same time. Looking at both sides of the calls enabled the service provider find problems relating to both ends of the SS7 signaling. NetClaw sequencer enabled the service provider to see both ends of the SS7 signaling in hex if he wanted to debug further.

<b>Filter</b> →	Range filter	Layou	t One	line		20		🔏 Sea <u>r</u> ch filt	er			
StartTime	EndTime	Probe	Txld	Rxld	LabelOPC	LabelDPC	LabelCIC	No of SUS	No of RES	Called Number	Redirection Number	Original
22.2.2007 14:41:06.79	i 22.2.2007	iqprobe	30180	30180	1-16-81	5-59-172	26-37	n/a	n/a	4234792400	n/a	n/a
22.2.2007 14:41:06.97	3 22.2.2007	iqprobe	30180	30180	5-59-172	1-16-81	17-13	n/a	n/a	4234792400	n/a	n/a
•												
/HDLU 3/Port 3-A-L	inks/Alink-cha	an2 fwd 20	007-02-22	14:41:0	06.796 MSU	ISUP 5-5	9-172 1-	16-81 2	5-37 IAM	4234792400 9165	251452	
/HDLU 3/Port 3-A-L	inks/Alink-cha	anl bwd 20	007-02-22	14:41:0	08.698 MSU	ISUP 1-1	6-81 5-	59-172 2	5-37 ACM			
/HDLU 3/Port 3-A-L	inks/Alink-cha	anl bwd 20	007-02-22	14:41:1	LO.731 MSU	ISUP 1- 1	6-81 5-	59-172 2	5-37 ANM			
/HDLU 3/Port 3-A-L	inks/Alink-cha	an2 fwd 2	007-02-22	14:42:1	12.424 MSU	ISUP 5- 5	9-172 1-	16- 81 2	5-37 REL	normal clearing		
/HDLU 3/Port 3-A-L	inks/Alink-cha	anl bwd 2	007-02-22	14:42:1	12.441 MSU	ISUP 1-1	6- 81 5-	59-172 2	5-37 RLC			

Figure	1	Service	provider	able	to	see	both	sides	of	а	call
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Filter → F	ta <u>n</u> ge filter 🔶	Layout	One	line	<b>→</b>	90		<b>86</b> s	lea <u>r</u> ch filter				
StartTime	EndTime	Probe	Txid	Rxid	LabelOPC	LabelDF	C Label	CIC N	lo of SUS	No of RE	S Called Number	Redirection Number	Original
22.2.2007 14:41:06.796	22.2.2007	iqprobe	30180	30180	1-16-81	5-59-172	26-37	n/a		n/a	4234792400	n/a	n/a
22.2.2007 14:41:06.979	22.2.2007	iqprobe	30180	30180	5-59-172	1-16-81	17-13	n/a		n/a	4234792400	n/a	n/a 🦉
(HDLIL 3/Port, 3-A-Lin)	ka/Alink-cha	nl hwd 20	07-02-22	14:41:0	6.979 MSII	TSUP 1-	16- 81	5- 59-	172 17-	13 TAM	4234792400 9165	251452	, ,
/HDLU 3/Port 3-A-Lin /HDLU 3/Port 3-A-Lin	ks/Alink-cha ks/Alink-cha	n2 fwd 20 n2 fwd 20	07-02-22 07-02-22	14:41:0 14:41:1	8.677 MSU 0.712 MSU	ISUP 5- ISUP 5-	59-172 59-172	1- 16- 1- 16-	81 17- 81 17-	13 ACM 13 ANM			
/HDLU 3/Port 3-A-Lin /HDLU 3/Port 3-A-Lin	ks/Alink-cha ks/Alink-cha	nl bwd 20 n2 fwd 20	07-02-22 07-02-22	14:42:1 14:42:1	2.449 MSU 2.718 MSU	ISUP 1- ISUP 5-	16- 81 59-172	5- 59-1 1- 16-	172 17- 81 17-	13 REL 13 RLC	normal clearing		

Figure 2 Second side of a call shown by the call sequencer

During the troubleshooting it was found that the service provider was using non-standard sub-system numbers in his network. This problem was fixed very fast by just looking the call sequences.

# Setting up call sequence for Netclaw

When a network operator has to troubleshoot and find a particular call he would immediately go to the NetClaw call sequencer. With a couple of steps a network user would be looking at any call sequence in their network as shown below.

1. Connect required interfaces- Connecting the required interfaces is easy as plugging in the network traffic bearing T1/E1 cables from service provider's monitor/mirror ports into the NetClaw. Netclaw can fully support 8 full duplex bi-directional links per HDLU card. Various connection cables like bantam cables are provided for easy connection to the service providers monitor/mirror ports.

2. Detect/Select/Autoscan the traffic interfaces- This is shown in diagram below the connection to required interfaces is performed by performing an auto scan and then after the auto scan is performed you would get the configuration of the network automatically

Port selection			X
Select ports for scanning			
HDLU scan Time Slots >= <u>6</u> 4Kb/s <u>1</u> 6Kbit/s Sub-Channels 32Kbit/s Sub-Channels	UMTS scan	AAL5 channels as (3GPP) as (Ericsson equipment)	
☐ <u>5</u> 6Kb/s (7 bit T1 Time Slot)	⊻PI List: VCI Range: CI <u>D</u> Range:	Click here to edit	
Scan Cancel Interv	al: 3.0 sec. 0.5 sec. 1.0 sec. 2.0 sec. 3.0 sec. 5.0 sec. 10.0 sec.		

After the scanning is complete we are shown a window which depicts channels which could were found during the scan and if the network user wanted to add all the channels or only selected channels as shown below.

-)	Po	rt scan of none	e						×
4	AII C	letected chanr	nels on this pro	obe					
		LIM	Port	User name	Туре	Filter	Timeslots B	mbxsrc	Timeslots A
		HDLU 3	Port 7	Scanned Cha	MTP	FISU=1;LSSU	120127	3,0,1	120127
		HDLU 3	Port 8	Scanned Cha	MTP	FISU=1;LSSU	120127	3,2,3	120127
					100	1%			
So	an I	inished succesful	lly (2)						
	A	dd all 🛛 🕅 Add	d selected	Close					

The access window is shown below which shows the 8 ports for 1 HDLU cards and what channels are configured on each port.

A new measurement - [/war/igprobe/data/chattanoga-22nd_measurement.igm] - NetClaw 3.0.0 - Administration m Elle Edit View Measurement Tools Multiger Help D Co D Co D Co B & Co M Co	node 📃 🗖
Access       Processing       Log       Results         Equirment (brannels)       Image: space spa	

We can also change each port of the HDLU card as given below

PBH         SOIP 1           P         SOIP 1           P         Point 1           P         Point 2           P         Point 3	Line Int	Name Number	Module HDL HDLU 3 3 E1	U 3	]			
Port 4	100001	Connecto	rs					_
Port 5	100000-		Name	Impedance	Coding	Framing	Number	
Port 6		Port Port	1	75 Ohms	HDB3	FRAMED	1	^
Port 7	- A -	Port Port	2	75 Ohms	HDB3	FRAMED	2	- 11
Port 8	1	Port Port	3	75 Ohms	HDB3	FRAMED	3	- 11
🖻-🗹 🏶 HDLU 4		Port		75 Unms	HDB3	FRAMED	4	- 11
- WKS Port 1	12.	Port Port		75 Onms	HDB3	FRAMED	5	- 11
- V Port 2	ě	Port Port	5	75 Ohms	HDB3	FRAMED	6	- 11
EI/2 Dod 2		Port Port	[	75 Ohms	HDB3	FRAMED	1	- 11
Port 6 Port 6 Port 7 Port 8								

The individual channels for each T1/E1 link would be set up as given below.

Eile Edit View Measure	ment ∐ools ∐elp Not Date at the state
	Processing      Log      Results      VolP Cos
Ecucarent <sup>1</sup> Channels 다 All Channel 전 Channel 2 전 Channel 3 단 Channel 3	Channel Channel 1           Name           System Wook           Topic           MTP           Protocol           WTP           Potocol           MTP           Potocol           Potocol           MTP           Potocol           MTP           Potocol           MTP           Potocol           MTP           MTP           Selection           Selection           MTP           MTP
Not configured	Done Probe Time: 22:33

3. Start measurement by pressing the green arrow as shown below.



4. After the measurement is started we get a dialog saying the system is preparing to start the measurement as given below.

₽ A	X
	<u> </u>

5. After the measurement has successfully started the green arrow would turn into a round circle as shown below.

File	Edit	⊻iew <u>M</u> easur	ement <u>H</u> elj	P			
<b>D</b> (	<b>b</b>	16 B X	₽ C2	₫ ► 0	<b>4</b> S	۲	
<u> </u>	<b>—</b>	Access	<b>]</b> —>	Processing	(	Log	Results

6. After you start the measurement, from the start measurement icon on top of the main window. The operator would go into the results window view.

	Access	Processing	Log	Results	1
_					٢.

7. The network operator can then look at entire call sequences in the sequence view under results window, as shown below.



8. Using the call sequencer the network operator can find particular calls occurring in particular time periods, calls based upon calling number, called number, originating point code, destination point codes, release cause values, and call violations.

Access	Processing	Log		esults							
Physical = QoS = Stati	stics Decodes	Sequences =	Event lo	ig —							
Layouts     BELLCORE_TCAP_0	Filter -	Range filter	Layout	Onel	ine	-		Ø		🚯 🕺 Search	filter
GPRSGS_BSSAPP_1	e No Nature	Calling Category		(	Connecti	on Type	Location	1		Calling number	TR
III ISUP_BELLCORE_59		10 - ordinary calling	subscriber	0 -	speech		Oh - user			2013394110	1 🚍
MAP2PP_EXP_ETSI_		10 - ordinary calling	subscriber	0 -	speech		4h - remol	te local n	etwork	4089716016	
- III MAP4 179	of the calling party	10 - ordinary calling	subscriber	0 -	speech		0h - user			3105409900	
WHITE CAP 128	of the calling party	10 - ordinary calling	subscriber	16	5 - 3.1 kH	z audio	0h - user			4236520165	
WHITE INAP 85		10 - ordinary calling	subscriber	0 -	- speech		Oh - user			8568135500	
		10 - ordinary calling	subscriber	0.	speech	_	Oh - user		-	2013394110	¥
	Number of Concession, Name of Street, or other	0 - calling party's ca	tegory unkno	wn   0 -	<ul> <li>speech</li> </ul>	C. Curtane and	3h - transi	it network	<	8884661258	
		10 - ordinary calling	subscriber	0 -	- speech		Oh - user			8456204156	
	of the calling party	10 - ordinary calling	subscriber	16	i - 3.1 kH	z audio	4h - remot	te local n	etwork	9737854710	
		10 - ordinary calling	, subscriber	0.	speech		4h - remol	te local n	etwork	4089716016	
	of the calling party	10 - ordinary calling	subscriber	16	5 - 3.1 kH	z audio	4h - remot	te local n	etwork	9735896700	
		1.0 - ordinary calling	subscriber	0-	speech		Oh - user			4234905694	
	of the calling party	10 - ordinary calling	subscriber	16	5 - 3.1 kH	zaudio	Oh - user			4236520165	
	of the calling party	10 - ordinary calling	subscriber	0.	speech		Un - user			2487061385	
	of the calling party	10 - ordinary calling	subscriber	16	5 - 3.1 KH	zaudio	4n - remo	te local n	etwork	7322023702	
		0 - calling party's ca	tegory unkno	iwn 0-	speech		Un - user		1	8565791100	-
	of the calling party	10 - ordinary calling	subscriber	16	- 3.1 KH	zaudio	4n - remo	te local h	etwork	9/3228////	
	de la colline de la	10 - ordinary calling	subscriber	0.	speech		un - user			4234905094	
	or the calling party	To - ordinary calling	subscriber	0.	- speech		rva			6207682923	
	4			1111	<i>1</i> 2						• •
	bwd 2007-02-22 1	4:41:58.280 MSU	ISUP 242	- 1- 12	2 5-	59-172	7-123	IAN '	71820514	172 888466125	8
	fud 2007-02-22 1	4:42:01.028 MSU	ISUP 5	- 59-172	2 242-	1- 12	7-123	ACM			
	bwd 2007-02-22 1	4:42:25.550 MSU	ISUP 242	- 1- 12	2 5-	59-172	7-123	REL :	normal o	clearing	
	fud 2007-02-22 1	4:42:25.869 MSU	ISUP 5	- 59-172	2 242-	1- 12	7-123	RLC			

Another powerful feature of call sequencer is the filter function. The filter function can quickly allow the operator to seek a single call from a several thousand calls based on the particular field. As shown below we see a filter at work in the sequencer window searching for messages based on called number and calling number.

Filter for WHITE_ISUP_23							
Filter	Filter 1						
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	digits (bcd)	+ •					
LabelOPC	Called Number in  4572112200 4572140000	<<					
LabelDPC	4372112222	-All					
LabelCIC	Filter 0						
No of RES	Filter 2						
Called Number	digits (bcd)	+ -					
	Calling Number in V4572112200	<<					
Original Called Numl	4572112222	All					
CalledNature							
Calling Category							
Connection Type							
Calling Number							
CallingNature							
Violation							
Cause							
Service Information C	•	•					
	OK	Cancel					

In addition to the filtering function network operators can also view a certain segment of call sequences for example the network operator is interested in all calls from phone number 410-740-7800 from 8am to 11am. This could be managed by running a time range filter in the sequence window, as given below.



# Conclusion

The NetClaw sequencer application covers all SS7 network interfaces, is easy to use while delivering results fast. The sequencer for call and session tracing is easy to use from any browser and hides the complexity for the end user; e.g. you can perform the dialog correlation in advance and relevant parameters for filtering are right at hand. Combined with the NetClaw statistical application, NetClaw protocol analysis and proactive alarming, NetClaw sequencer is a very powerful solution for rapid troubleshooting of SS7 networks.

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