

Introducing DiagnostX



US Patent No. 8,565,096 B2,
other patents pending

DiagnostX is an over-the-air radio analyzer – the only one on the market.

DiagnostX monitors the base station RECEIVE frequency, analyzing all control channel transmissions from the subscriber radios on the system.



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Protocols and Frequencies

DiagnostX is protocol and frequency specific

Available Protocols:

- P25 Trunked
- P25 Conventional
- SmartNet™
- SmartZone™
- DMR
- MDC 1200
- EDACS

Available Frequencies:

- VHF
- UHF
- 700 MHz band
- 700/800 MHz hybrid
- 800 MHz band
- 900 MHz band



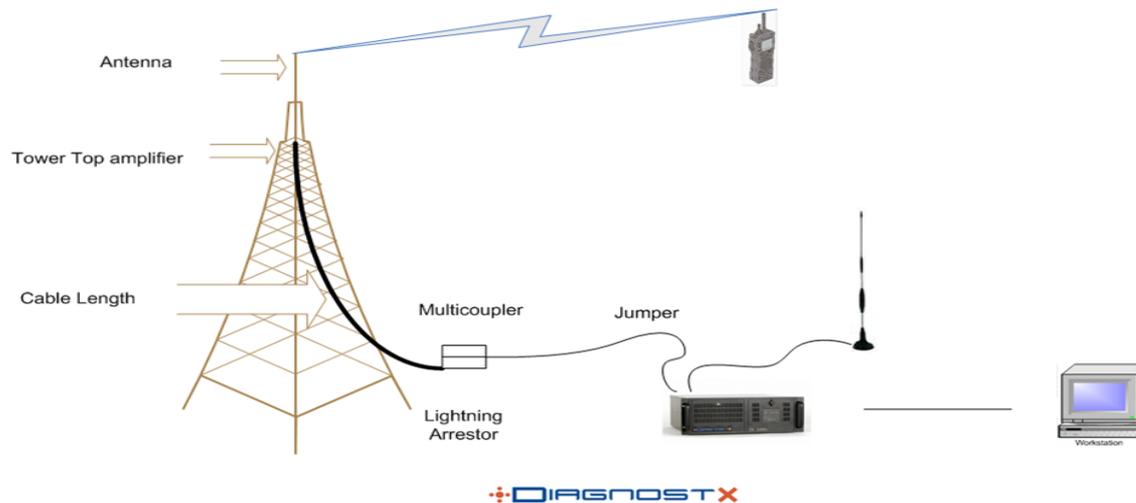
Metrics and Measurements

1. **Frequency Error**
2. **Frequency Deviation**
3. **Frequency Variation**
4. **Symbol Error 600, Symbol Error 1800 (P25)**
5. **Maximum Frequency Deviation**
6. **Modulation Fidelity**
7. **BER (on a per transmission basis, %)**
8. **RSSI (on a per transmission basis, dBm)**
9. **SNR (on a per transmission basis)**
10. **Reserve Gain at the multi-coupler (dBm)**



Installation & Operation

- Connect the universal power supply to an AC power source (100-240V, 50-60 Hz)
- Connect to an antenna: RX antenna at the multi-coupler or stand-alone antenna



Installation & Operation

- Enter control channel frequencies and define thresholds
- All transmissions received at the antenna are analyzed
- DiagnostX requires 12 QUALIFYING transmissions from a radio in order to evaluate the alignment of the radio
- Transmissions weaker than -95 dBm are deemed too weak to evaluate. Transmissions known to have collided or been subjected to multipath are not analyzed



Benefits of DiagnostX

Proactive – Effective – Efficient

1. Ensures operational readiness
 - Identifies out of tune radios
 - Measures radio alignment constantly
2. Reduces maintenance costs
 - Address only radios out of specification
 - Well aligned radios stay in the field
3. High ROI
 - Approximately 80-85% of radios operate within tolerance
 - Reduces technician's man-hours by addressing **ONLY** the faulty radios
4. The ideal complement to an auto-tune service monitor.



Benefits of DiagnostX

5. **Indispensable P25 migration tool; fast new radio deployment**
 - **Helps ensure smooth P25 implementation**
 - **12 PTTs evaluates radios much faster than connecting the radio to a service monitor for analysis**
6. **Constantly monitors radios 24/7/365, covering all shifts**
7. **Completely autonomous from the radio system**
8. **Accurate measurements**
 - **Critical matrices**
 - **RSSI / SNR**
 - **System Site Reserve Gain value at the multi-coupler**
 - **Bit Error Rate (BER)**



Demonstration of P25 System

User Defined Thresholds

Thresholds X

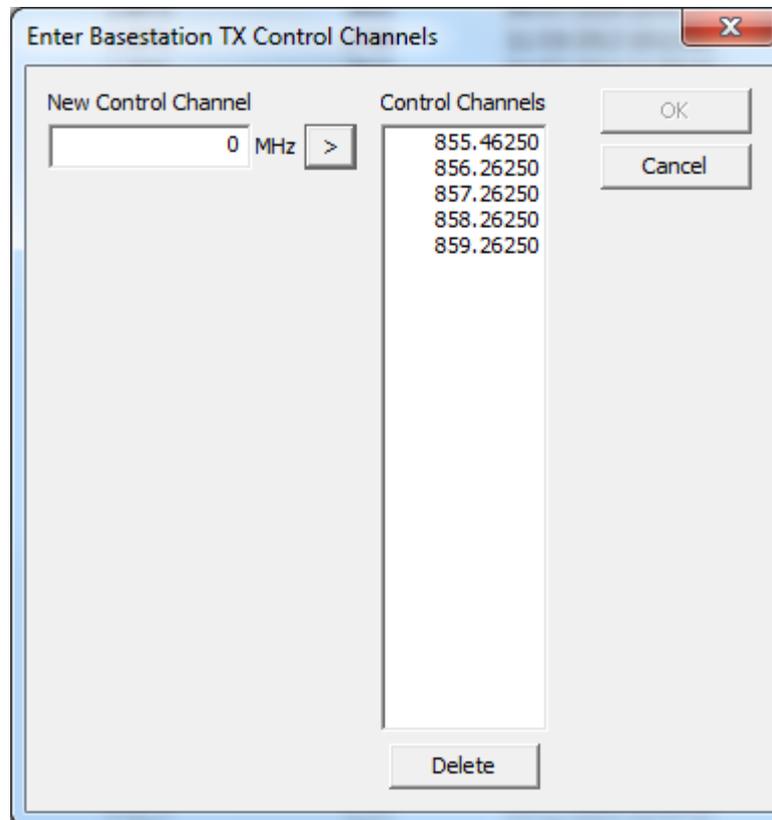
RF Frequency Error (max 1209)	500		OK
Modulation Fidelity	5		Cancel
Symbol Frequency Error 600	100		
1800 is 3 times threshold of 600	300		
Maximum Frequency Deviation	3300	FCC Emission Mask	Mask G ▼

Warning: Changing Thresholds will result in being disconnected while system recalculates. You will be automatically reconnected when it is finished.



Demonstration of P25 System

Enter Control Channels



The screenshot shows a software dialog box titled "Enter Basestation TX Control Channels". It features a "New Control Channel" input field with "0 MHz" and a right-pointing arrow button. To the right is a list box labeled "Control Channels" containing five entries: 855.46250, 856.26250, 857.26250, 858.26250, and 859.26250. Below the list is a "Delete" button. On the right side of the dialog are "OK" and "Cancel" buttons.



Failed Evaluation List

Locus DiagnostX For P25 Demo: Failed Evaluation List

File Configure Tools Window Help

Disconnect

Radio ID	Alias	RF Frequency Err...	Symbol Freq Err ...	Symbol Freq Err 18...	Modulation Fide...	Max Freq Deviation	Date/Time
13809	XX-P-E4B	X 530	-36	-103	1.59%	2733	02/04/2014 15:27:44
4032	XXOL-32	X 552	-34	-82	1.60%	2786	02/04/2014 15:34:19
4117	XX17	X 677	-28	-72	1.59%	2786	02/04/2014 15:27:40
4202	XXOL-202	X 586	-22	-72	1.59%	2779	02/04/2014 15:19:04
11648	XXY-T46	X 546	-22	-72	1.58%	2792	02/04/2014 11:04:39
11784	XXEET-9720	X 605	-22	-55	1.59%	2810	02/04/2014 13:38:45
13042	XXS 1	X 503	-33	-83	1.60%	2805	02/04/2014 11:25:51
13059	XXMM POST 5	X 597	-21	-63	1.59%	2798	11/19/2013 10:13:00
13110	XXS 3	X 428	-24	-66	1.59%	2811	02/04/2014 14:21:59
13705	XX0	X 564	-36	-98	1.59%	2760	02/04/2014 13:22:31
13807	XX-P-E3	X 513	-46	-116	1.59%	2732	01/31/2014 11:06:35
4018	XXOL-18	X 568	-33	-79	1.59%	2776	02/04/2014 14:17:14
5072	XX72	X 583	-14	-61	1.59%	2817	02/04/2014 14:56:54
12127	XXC-T10	X 496	-29	-92	1.59%	2797	02/04/2014 13:04:49
12212	XXD 5	109	X 276	X 774	1.65%	X 4268	02/04/2014 12:55:32
12314	XXV	203	X 259	X 728	1.65%	X 4169	08/20/2012 15:06:08
12416	XX 8	X 459	-34	-85	1.58%	2779	02/04/2014 13:21:47
12450	XX 12	X 491	-20	-58	1.58%	2825	02/04/2014 14:52:37
4038	XXOL-24	X 734	-28	-66	1.59%	2774	02/04/2014 14:57:47
12453	XX 9	X 498	-25	-81	1.59%	2790	02/04/2014 15:32:09
13048	XX57	X 1012	-28	-77	1.60%	2790	08/27/2013 18:54:10
4007	XXOL-7	X 714	-29	-70	1.60%	2785	02/04/2014 14:36:04
4041	XX41	X 513	-20	-58	1.59%	2813	02/04/2014 14:58:15
4092	XXOL-92	X 511	-27	-70	1.59%	2790	02/04/2014 07:54:53
11657	XXY-U98	X 700	-26	-84	1.59%	2790	02/04/2014 12:34:06
11691	XX691	X 501	-30	-91	1.59%	2764	12/20/2013 17:11:21
12133	XXC-T7	X 605	-43	-105	1.59%	2755	04/03/2012 08:56:32
12490	XXMM POST 1	X 518	-22	-58	1.58%	2816	01/30/2014 13:22:55

Ready Connected 133 Failed Evaluation 225 Transmissions CC 814.26250MHz CC detected



Passed Evaluation List

Radio ID	Alias	Date/Time	RF Freq Err	Symbol Freq Err 600	Symbol Freq Err 1800	Modulation Fidelity	Max Freq Devi
0	XX	02/04/2014 03:56:14	8	32	142	1.61%	2125
1	XXBANY FIRE	01/18/2014 09:39:48	9	-49	-128	1.59%	2703
10	XXIC	11/20/2013 14:30:17	83	-43	-129	1.59%	2706
101	XXCK UP 1	10/16/2012 14:45:33	342	-35	-91	1.59%	2766
102	XXCK UP 2	01/15/2014 16:16:51	405	-21	-64	1.59%	2808
103	XXCK UP 3	01/20/2014 15:14:39	374	-24	-72	1.58%	2788
104	XXCK UP 4	01/24/2014 05:04:21	40	-35	-95	1.59%	2770
105	XXCK UP 5	04/17/2013 23:23:40	327	-24	-65	1.59%	2802
106	XXCK UP 6	05/16/2013 13:50:56	208	-36	-89	1.59%	2761
11	XXic Mob	02/04/2014 15:17:33	365	-41	-103	1.59%	2745
11501	XXTH SECURITY	10/18/2012 10:48:01	276	-31	-86	1.60%	2810
11502	XXS-P-3	01/10/2014 08:42:20	231	-48	-131	1.59%	2713
11503	XXS-P-1	01/02/2014 10:53:14	5	-28	-85	1.59%	2752
11511	XXS-T1	02/04/2014 12:55:13	243	-17	-59	1.58%	2804
11512	XXS-T4	11/07/2013 14:27:42	439	-28	-74	1.59%	2774
11513	XXS-RON T	02/04/2014 15:17:36	246	-21	-68	1.59%	2797
11514	XXS-T2	01/27/2014 07:36:33	245	-13	-45	1.59%	2832
11515	XXS-T5	01/27/2014 14:37:03	432	-24	-65	1.59%	2811
11518	XXS-T6	01/24/2014 15:47:52	429	-36	-95	1.59%	2750
11520	XXS-T3	11/20/2013 15:17:45	299	-32	-87	1.59%	2769
11600	XXY-BASE	01/17/2014 14:46:50	169	-23	-70	1.59%	2801
11601	XXY-P-21	02/04/2014 15:30:59	461	-37	-96	1.58%	2726
11602	XXY-P-91	01/27/2014 13:28:28	289	-33	-84	1.59%	2765
11603	XXY-P-90	02/04/2014 12:51:58	7	-28	-73	1.59%	2814
11604	XXY-P-1	10/31/2013 16:48:13	139	-35	-100	1.60%	2766
11605	XXY-P-2	01/27/2014 11:13:18	244	-37	-103	1.58%	2758
11606	XXY-P-3	01/30/2014 08:53:54	52	-38	-106	1.58%	2750
11610	XXY-MAINT	02/03/2014 23:50:30	232	-27	-83	1.59%	2763
11619	XX619	02/04/2014 12:56:08	457	-29	-57	1.59%	2802
11622	XXY-T720	02/04/2014 13:31:02	285	-30	-90	1.59%	2770
11626	XXY-T26	10/09/2012 09:36:59	112	-18	-57	1.59%	2829
11628	XXY-T27	01/22/2014 10:16:45	175	-21	-82	1.59%	2791
11630	XXY-T28	10/01/2012 13:53:41	349	-22	-80	1.59%	2775
11631	XXY-T34	02/04/2014 12:54:40	193	-22	-69	1.60%	2784
...

1110 Radios



Transmissions

Basestation RX Control Channel Transmissions

Filter on RadioId(s) Clear List Auto Scroll OK

Date/Time	Radio ID	Group ID	SNR	RSSI	SiteNum	Op Code	BER
02/04/2014 15:27:51	13040	0	39	-84	1	Unit Registration Request	0%
02/04/2014 15:27:51	13040	3851	39	-64	1	Group Affiliation Request	0%
02/04/2014 15:27:52	13040	0	27	-88	1	Unit Registration Request	0%
02/04/2014 15:27:52	13040	337	30	-88	1	Group Affiliation Request	0%
02/04/2014 15:27:58	13040	1933	29	-88	1	Group voice service request	0%
02/04/2014 15:27:58	1251	0	25	-93	1	De-Registration Request	0%
02/04/2014 15:28:03	5062	0	35	-89	1	Unit Registration Request	0%
02/04/2014 15:28:04	5062	337	33	-84	1	Group Affiliation Request	0%
02/04/2014 15:28:08	12465	0	39	-64	1	Unit Registration Request	0%
02/04/2014 15:28:08	12465	1933	38	-65	1	Group Affiliation Request	0%
02/04/2014 15:28:11	13832	0	38	-66	1	Unit Registration Request	0%
02/04/2014 15:28:11	13832	115	38	-64	1	Group Affiliation Request	0%
02/04/2014 15:28:14	12426	0	37	-73	1	Unit Registration Request	0%
02/04/2014 15:28:14	12426	1933	37	-70	1	Group Affiliation Request	0%
02/04/2014 15:28:24	12230	0	35	-74	1	Unit Registration Request	0%
02/04/2014 15:28:24	12230	315	34	-75	1	Group Affiliation Request	0%
02/04/2014 15:28:42	11831	0	37	-71	1	Unit Registration Request	0%
02/04/2014 15:28:43	11831	319	36	-71	1	Group Affiliation Request	0%
02/04/2014 15:28:44	4003	0	13	-105	1	Unit Registration Request	2%
02/04/2014 15:28:44	13117	0	37	-67	1	Unit Registration Request	0%
02/04/2014 15:28:45	13117	3851	38	-64	1	Group Affiliation Request	0%
02/04/2014 15:28:45	13185	1953	23	-96	1	Group Affiliation Request	0%
02/04/2014 15:28:48	4003	0	15	-105	1	Unit Registration Request	2%
02/04/2014 15:28:49	4003	0	14	-105	1	Unit Registration Request	2%
02/04/2014 15:28:50	4003	0	14	-104	1	Unit Registration Request	2%
02/04/2014 15:28:51	4003	0	12	-108	1	Unit Registration Request	22%
02/04/2014 15:28:52	5003	0	35	-66	1	Unit Registration Request	0%
02/04/2014 15:28:54	5003	337	36	-66	1	Group Affiliation Request	0%



**Proactive
Efficient
Effective**



More information available by calling LocusUSA at 321-727-3077

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