INNOVATIVE RF / RADIO / TV / VIDEO TEST & MEASUREMENT TOOLS

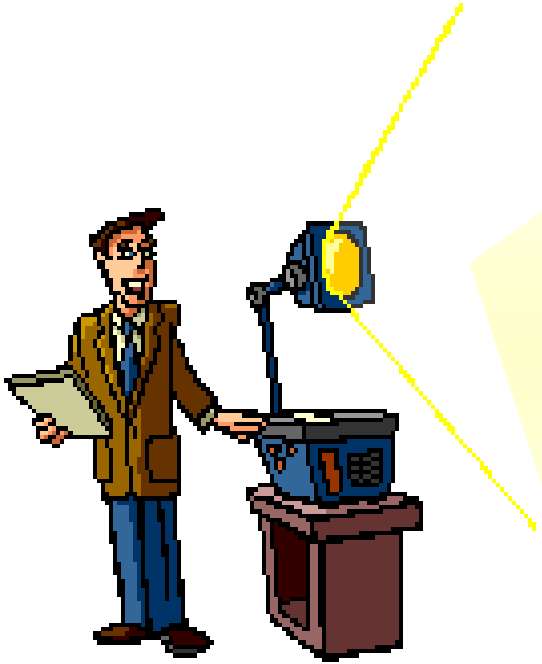
Presentation by **Eddy Vanderkerken**
Founder & General Manager of SOURCERER LLC --- since 2014 in Dallas, TX

The presentation will focus on the newest test & measurement tools, essential for the maintenance of a broadcast station.

With ever less technical support staff and shrinking budgets, everyone is looking for smaller, lighter, more versatile and easier to use devices that are affordable.

SOURCERER is always looking for new cool tools, especia ATSC 3.0 nextgenTV

Agenda



SOURCERER

YOUR SOURCE
RF VIDEO TV BROADCAST
TEST & MEASUREMENT

- Products & applications
- Questions

Company Org Chart (not so confidential)

Video testing

Super versatile video tool:

- 5” 800x480 monitor
- Analyzer
  - Waveform
  - Vector
  - Eye & Jitter
- Generator
  - SMPTE color bars
  - Moving test pattern
- Cross convertor
  - SDI
  - HDMI
  - VGA
  - Analog
- 8 Ch. Audio

Video testing: Analog, SDI and IP

PHABRIX Sx video generators & analyzers:

- Analog video, audio
- SD-SDI, HD-SDI and 3G-SDI with AES audio
- Selectable video patterns & audio up to 16 ch.
  - Including moving picture / zoneplates
  - Text insertion
- SFP's for optical, HDMI or IP ST 2110/2059/2022-6
- Picture, audio, waveform, vectorscope
- Eye Height & Jitter

PHABRIX QxP Portable Waveform Monitor
25G ST 2110 and 12G-SDI with Battery Power:

PHABRIX®
A Leader Company

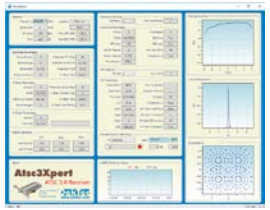
ASI probe

AT4USB ASIPOD

Lighter size transport stream probe

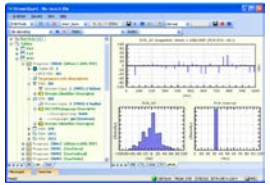
- Via USB to PC
- Truly pocket sized
- Record & Playback
- Lifetime DVS software license
- Also other probes and IP convertors

ASI and RF probes



ATSC3XPert

RFXpert RF monitoring & analysis



StreamXPert ASI analyzer software

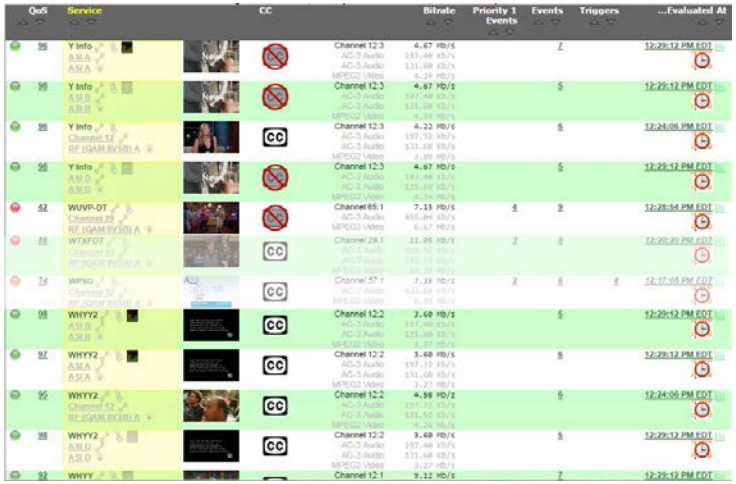
ATSC 1.0 & ATSC 3.0 probe

8VSB & ASI probe

ASI, IP and RF tools

Triveni Digital StreamScopeS RM and XM

- Dektec hardware (RF)
- Audio loudness monitoring for **CALM** Act compliance
- CC monitoring



ATSC 3.0

triveni DIGITAL

ASI and RF probes

DiviDual ASI
Pocket size transport stream probe

EdgeProbe
Dual or Quad ATSC 1.0/3.0, ASI, IP monitoring

ReFeree3
Compact ATSC 1.0/3.0 field analyzer

RF Catcher
Portable RF Recording & Playback

ENENSYS Technologies

RF monitoring

PROWATCH *Neo*

TV / FM monitoring with 1, 8 or 16 inputs
SNMP / Web Server remote access and control
Alarm notifications
Compatible with DataMiner
Decoding up to H.265 and 4K UHD
ATSC, DVB-S, DVB-S2, J.83/B, FM with RDS
Optional spectrum monitoring and storage
Optional ASI monitoring with TS analysis and recording
Optional IPTV multicast measurement and decoding
7 GB for measurement protocols, screenshots and transport stream recordings
Features include constellation diagram, LTE ingress test, Dynamic echoes analysis, StealthID (instant identification of tuning parameters), PLS (Physical Layer Scrambling), Ultra fast spectrum analyzer (70 ms sweep time), with MAX and MIN hold,
FM RDS radio measurement and decoding,
Screenshots and Datalogger for measurement reports,
Beacon-Flyaways SNG and VSAT, Wideband LNB, WiFi 2.4 GHz, LTE 1.8 GHz, OTT, Service Recording,
Field strength measurement, Task planner, Merogram, Spectrogram, Signal Monitoring, Remote control (webControl), MER by carrier, Channel Monitoring

24/7 Content Monitoring

LUNA, LUNA+, ENCOMPASS
Compliance Monitoring Multiviewer & Smart Logger Systems

24/7 capture solution with live multiviewer, QoS monitoring, logging, alerting and Transport Stream analytics:

KEY FEATURES
Scalable Inputs
24/7 Monitoring and Logging
24/7 Proxy Capture
Local Multiviewer/Video Wall
Remote Access via Web or Mobile App
User Configurable Alerts and Alarms
Email, Text and SNMP Alerts
Microsoft Teams, WebEx Teams, Slack
Transcoding
Live Stream Editing
Cloud Services Integration

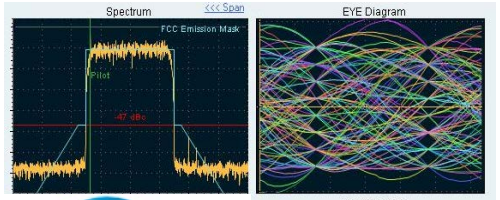
MEASUREMENTS
Closed Captioning
608 & 708
XDS Data
SCTE 35/104
Nielsen Audio Watermarks
LKFS Measurements per
ATSC A/85 CALM Act
ETSI TR101.290 & ATSC
A/78
Signal Lost
Black/Static Image
PSIP loss, logging

Inputs options from baseband (SDI, HD-SDI, UHD, Composite, HDMI) to TS (ASI, DVB, ATSC 1.0, ATSC 3.0) to IP (UDP, IGMPv3, SMPTE 2022, SMPTE 2110) to OTT Platforms (HLS, MPEG-DASH, vMVPD capture).

24/7 TV Monitoring, Commissioning

AVATEQ AVQ 200 / AVQ1020 / AVQ1022

- ATSC and/or ATSC 3.0
- MER, SNR, EVM
- RMS, PAPR, Max, CCDF
- Spectral measurements – signal bandwidth, central frequency shift, shoulder attenuation
- Linear Distortions – Amplitude and Phase Responses, Group Delay
- Echo profile and matching issues
- Exciter optimization
- Equalizer On/Off



ATSC 3.0

AVATEQ technology + innovation

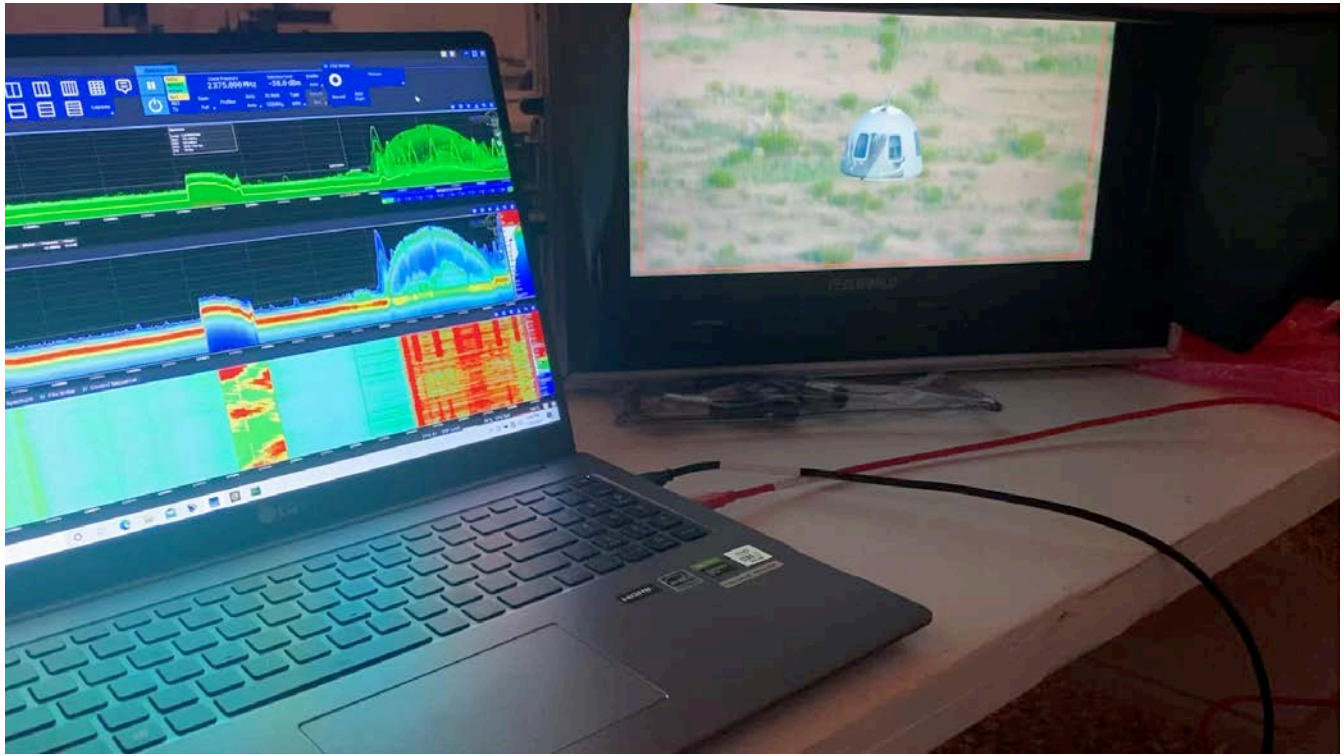
Real time spectrum analyzers

AARONIA AG

- 9 kHz to 6 GHz / 8 GHz
- SUPER fast capture of 44 to 245 MHz bandwidth, up to 3 THz / s
- PC (USB) operated with free RTSA Suite PRO Software

Real time spectrum analyzers

- Example using the V6 RTSA:
- Launch / landing Telemetry & Comms of BLUE ORIGIN space flight
- July 20th 2021



Measurement antennas

- Omnidirectional
- Directional
- Magnetic
- Electrical
- Pre-amplifiers (battery operated)

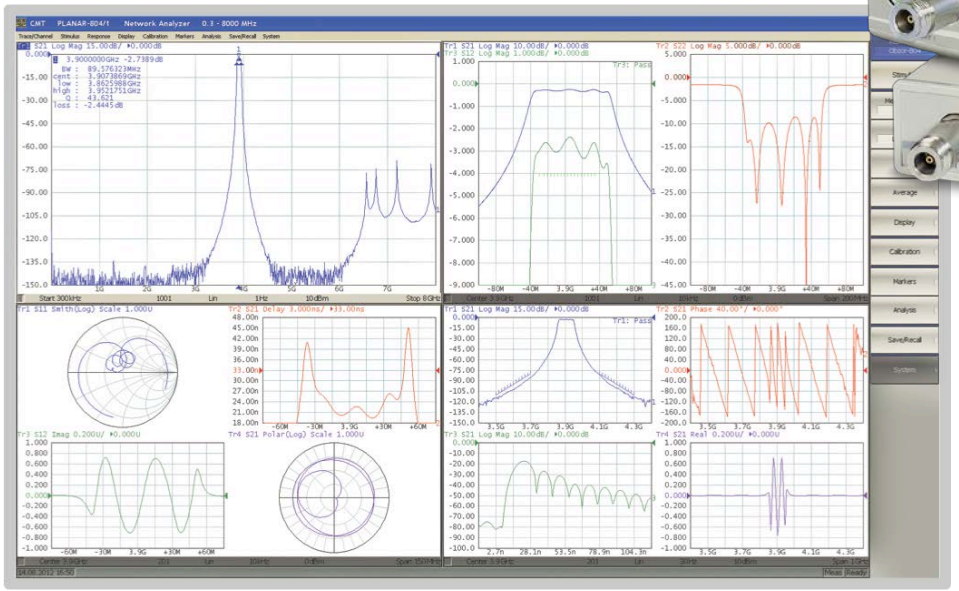
Antenna testing, line and filter sweeping

- 2-port VNA's with single or dual paths
- USB connection to PC
- S11 and S12 or all 4 S-parameters
- 200,000 measurement points, 70us
- All measurements incl. TDR, DTF

S5045 2-port dual path
From 9kHz to 4.5GHz

TR1300/1 2-port single path
From 300kHz to 1.3GHz

Auto Cal Module available!

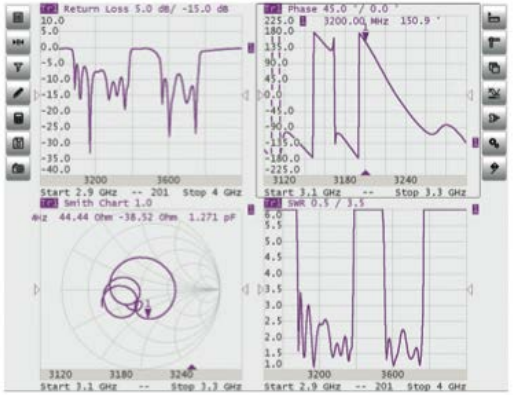


COPPER MOUNTAIN TECHNOLOGIES

Antenna testing

- Single port VNA
- USB connection to PC
- S11 reflection measurement:
  - Smith Chart
  - SWR
  - Return Loss
  - Cable Loss
  - Distance to fault
  - Time domain
- 4 simultaneous measurement channels

R60: 1MHz to 6GHz
R140: 85MHz to 14GHz



COPPER MOUNTAIN TECHNOLOGIES

RF Power Sensors

LadyBug LB5908A

True RMS Average Power Sensor

1 MHz - 8 GHz
-60 dBm to +26 dBm
USB controlled, PMA-12 software included
N-male connector (others availabe as option)

TV testing

PROMAX

ATLAS NG

- 10.1" Multitouch screen
- Up to 6 GHz new spectrum analyzer
- DVB-S2x and ATSC 3.0
- Multicast/unicast multistream analysis
- SDI analysis
- Advanced OTT measurements
- Basic optical fibre measurements

VERSION: DVB | ISDB-T | ATSC | ATSC 3.0

ATLAS

nextgenTV

ATSC 3.0

- 6 GHz Spectrum Analyzer
- ATSC 1.0 & 3.0, DVB-S/S2/S2X
- MPEG-2/4 AVC, H.264, H.265
- HEVC and 4K UHD
- ASI TS Analyzer, Recorder, Player
- FM + RDS
- 3G-SDI for studio
- IPTV, OTT, Wi-Fi Analyzer
- 1 pps / GPS

RANGER Neo 2

- IPTV analyzer
- High resolution filters
- TS-ASI input and output
- Common Interface slot
- Transport Stream recorder/player
- Transport Stream analyzer

VERSIONS: DVB | ISDB-T | DVB | ISDB-T | ATSC

RANGER Neo +

- Web Server remote control
- Merogram and Spectrogram
- Fibre optics and GPS options
- More than 4 hours battery time

VERSIONS: DVB | ISDB-T / DVB | ISDB-T | ATSC

RANGER Neo Lite

- Touch screen
- HEVC H.265 decoding
- Wide band LNB compatibility
- Wi-Fi analyzer

VERSIONS: DVB | ISDB-T / DVB | ISDB-T | ATSC

HD RANGER UltraLite

- Tablet size
- The lightest in the range

VERSION: DVB

Non-ATSC

HD RANGER Eco

- DVB-T2, DVB-C2, DVB-S2, DSS
- Super spectrum analyzer
- Triple split display
- Dolby Digital Plus
- Dynamic echoes analyzer

VERSION: DVB

TV testing

ATLAS

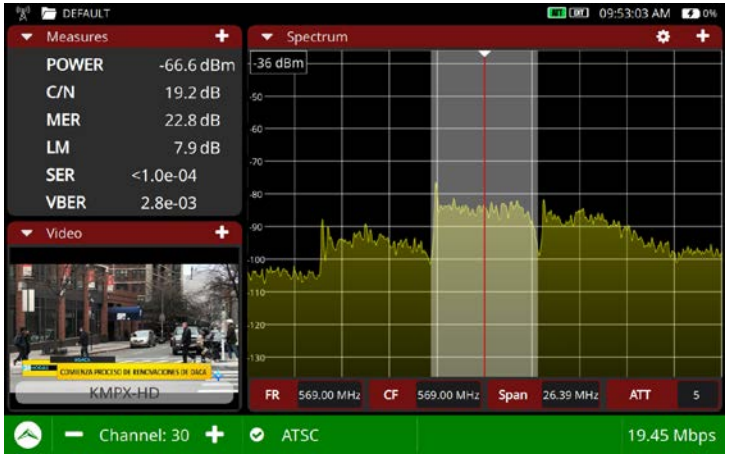
PROMAX

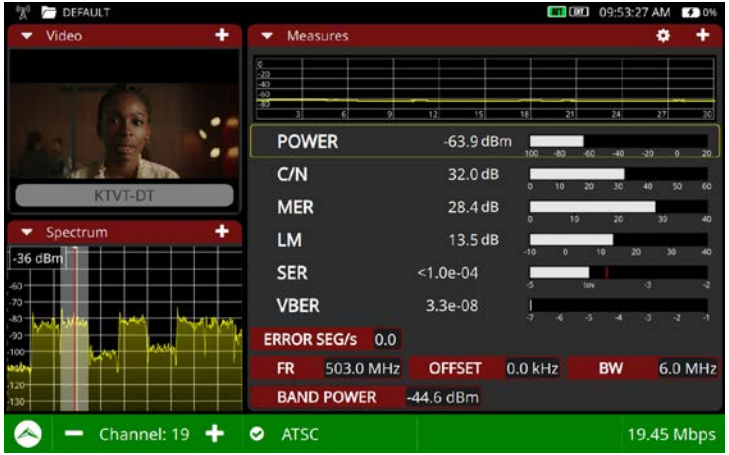
Full featured, including:

- 6 GHz Spectrum Analyzer
- ATSC 1.0 & ATSC 3.0
- DVB-S/S2/S2X
- QAM – J.83/B
- IPTV, OTT, Wi-Fi Analyzer
- MPEG-2/4 AVC, H.264, H.265
- HEVC and 4K UHD
- ASI Analyzer, Recorder, Player
- FM + RDS
- 3G-SDI for studio
- 10 MHz / 1 pps / GPS / drive test

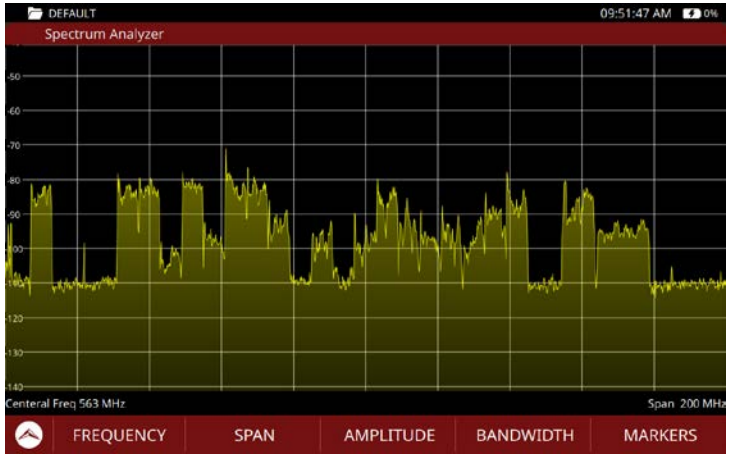
nextgenTV ATSC 3.0

TV testing

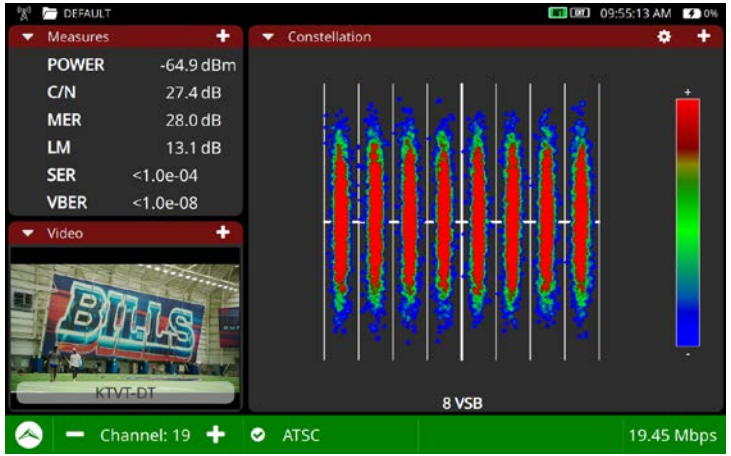

DEFAULT
09:53:03 AM
Measures
POWER -66.6 dBm
C/N 19.2 dB
MER 22.8 dB
LM 7.9 dB
SER <1.0e-04
VBER 2.8e-03
Video
KMPX-HD
Spectrum
-36 dBm
FR 569.00 MHz
CF 569.00 MHz
Span 26.39 MHz
ATT 5
Channel: 30
ATSC
19.45 Mbps

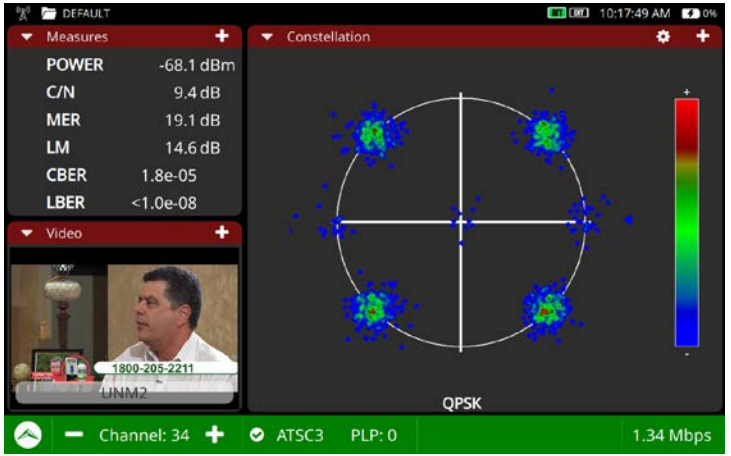

DEFAULT
09:53:27 AM
Video
KTVT-DT
Measures
POWER -63.9 dBm
C/N 32.0 dB
MER 28.4 dB
LM 13.5 dB
SER <1.0e-04
VBER 3.3e-08
ERROR SEG/s 0.0
FR 503.0 MHz
OFFSET 0.0 kHz
BW 6.0 MHz
BAND POWER -44.6 dBm
Spectrum
-36 dBm
Channel: 19
ATSC
19.45 Mbps

DEFAULT
09:53:54 AM
Spectrum
-36 dBm
Measures
POWER -66.5 dBm
C/N 20.0 dB
MER 22.5 dB
LM 7.6 dB
SER 4.0e-05
VBER 4.7e-04
Video
24 HORAS
KMPX-HD
Channel: 30
ATSC
19.45 Mbps


DEFAULT
09:51:47 AM
Spectrum Analyzer
Centeral Freq 563 MHz
Span 200 MHz
FREQUENCY
SPAN
AMPLITUDE
BANDWIDTH
MARKERS

DEFAULT
10:15:58 AM
Measures
POWER -66.5 dBm
C/N 14.0 dB
MER 20.0 dB
LM 15.5 dB
CBER 3.4e-06
LBER <1.0e-07
Video
UNM2
Spectrum
-36 dBm
FR 593.00 MHz
CF 599.00 MHz
Span 48.63 MHz
ATT 15
Channel: 34
ATSC3
PLP: 0
1.43 Mbps

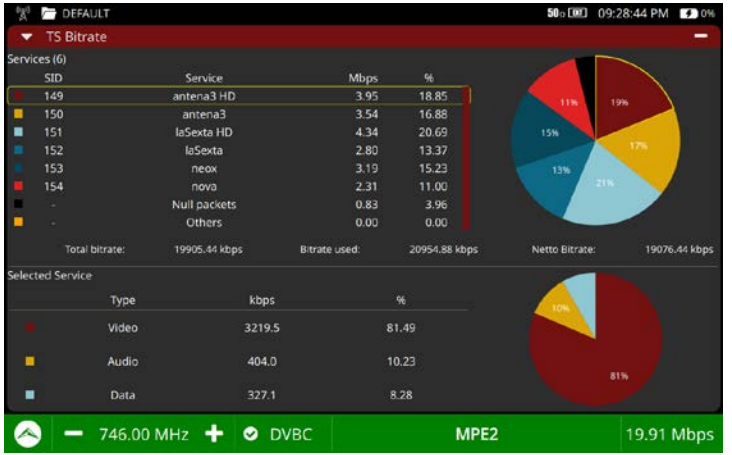

DEFAULT
09:55:13 AM
Measures
POWER -64.9 dBm
C/N 27.4 dB
MER 28.0 dB
LM 13.1 dB
SER <1.0e-04
VBER <1.0e-08
Video
KTVT-DT
Constellation
8 VSB
Channel: 19
ATSC
19.45 Mbps

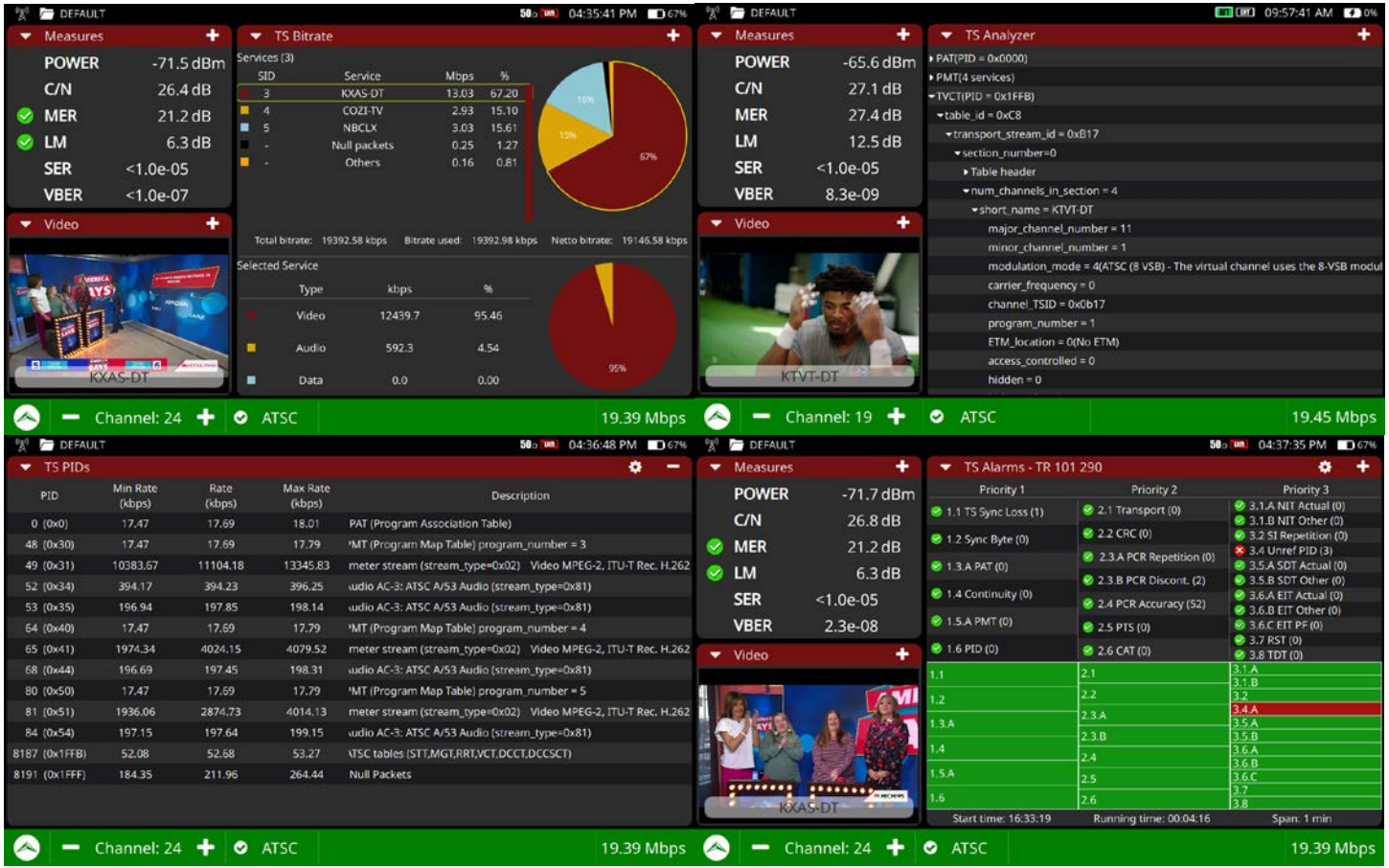

DEFAULT
10:17:49 AM
Measures
POWER -68.1 dBm
C/N 9.4 dB
MER 19.1 dB
LM 14.6 dB
CBER 1.8e-05
LBER <1.0e-08
Video
1800-205-2211
UNM2
Constellation
QPSK
Channel: 34
ATSC3
PLP: 0
1.34 Mbps

DEFAULT
09:53:13 AM
Measures
POWER -65.4 dBm
C/N 27.1 dB
MER 27.6 dB
LM 12.7 dB
SER <1.0e-04
VBER 5.8e-08
Spectrum
-36 dBm
FR 503.00 MHz
CF 513.19 MHz
Span 48.63 MHz
ATT 0
Video
KTVT-DT
Channel: 19
ATSC
19.45 Mbps

DEFAULT
09:53:21 AM
Measures
POWER -61.0 dBm
C/N 22.1 dB
MER 23.4 dB
LM 8.5 dB
SER 2.1e-06
VBER 2.6e-04
TS Analyzer
PAT(PID = 0x0000)
PMT(5 services)
Service 6 (PMT_PID = 0x0080)
Service 4 (PMT_PID = 0x0050)
Service 2 (PMT_PID = 0x0040)
Service 3 (PMT_PID = 0x0060)
Service 1 (PMT_PID = 0x0030)
Table header
PID=0x0031: Video MPEG-2, ITU-T Rec. H.262 | ISO/IEC 13818-2 or ISO/IEC 11172-2
ES_info_length:23
STD_descriptor
Smoothing_buffer_descriptor
data_stream_alignment_descriptor
caption_service_descriptor
descriptor_tag = 0x86
descriptor_length = 7
number_of_services = 1
service = 1
Video
KMPX-HD
Channel: 30
ATSC
19.45 Mbps

DEFAULT
09:52:00 AM
Measures
POWER -67.0 dBm
C/N 17.9 dB
MER 21.0 dB
LM 6.1 dB
SER 1.5e-03
VBER 3.2e-03
Video Values
Service: WFAA-HD
Provider:
Network:
SID: 2 (0x2)
LCN: -----
TSID: 2813 (0xAFD)
NID: 0 (0x0)
ONID: 0 (0x0)
APP: 0
URL: -----
Scrambled: No
Languages:
Subtitles:
Audio desc:
Teletext: No
Video
PID: 65 (0x41)
Bitrate: 4998 kbps
Codec: MPEG2
NONE@NONE
1280x720p 16:9 59.94 Hz
Audio
PID: 0 (0x0)
Bitrate: 369 kbps
Codec: DD
Language:
48 kHz Stereo
Video
WFAA-HD
Channel: 30
ATSC
19.45 Mbps

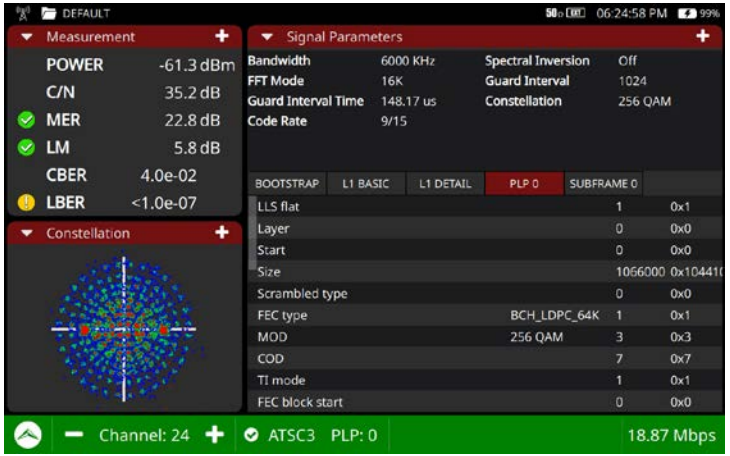

DEFAULT
09:28:44 PM
TS Bitrate
Services (6)
SID Service Mbps %
149 antena3 HD 3.95 18.85
150 antena3 3.54 16.88
151 laSexta HD 4.34 20.69
152 laSexta 2.80 13.37
153 neox 3.19 15.23
154 nova 2.31 11.00
Null packets 0.83 3.96
Others 0.00 0.00
Total bitrate: 19905.44 kbps
Bitrate used: 20954.88 kbps
Netto Bitrate: 19076.44 kbps
Selected Service
Type kbps %
Video 3219.5 81.49
Audio 404.0 10.23
Data 327.1 8.28
746.00 MHz
DVBC
MPE2
19.91 Mbps


DEFAULT
04:35:41 PM
Measures
POWER -71.5 dBm
C/N 26.4 dB
MER 21.2 dB
LM 6.3 dB
SER <1.0e-05
VBER <1.0e-07
TS Bitrate
Services (3)
SID Service Mbps %
3 KXAS-DT 13.03 67.20
4 COZI-TV 2.93 15.10
5 NBCLX 3.03 15.61
- Null packets 0.25 1.27
- Others 0.16 0.81
Total bitrate: 19392.58 kbps Bitrate used: 19392.98 kbps Netto bitrate: 19146.58 kbps
Selected Service
Type kbps %
Video 12439.7 95.46
Audio 592.3 4.54
Data 0.0 0.00
Video
KXAS-DT
Channel: 24
ATSC
19.39 Mbps
DEFAULT
09:57:41 AM
Measures
POWER -65.6 dBm
C/N 27.1 dB
MER 27.4 dB
LM 12.5 dB
SER <1.0e-05
VBER 8.3e-09
TS Analyzer
PAT(PID = 0x0000)
PMT(4 services)
TVCT(PID = 0x1FFB)
table_id = 0xC8
transport_stream_id = 0xB17
section_number=0
Table header
num_channels_in_section = 4
short_name = KTVT-DT
major_channel_number = 11
minor_channel_number = 1
modulation_mode = 4(ATSC (8 VSB) - The virtual channel uses the 8-VSB modul
carrier_frequency = 0
channel_TSID = 0x0b17
program_number = 1
ETM_location = 0(No ETM)
access_controlled = 0
hidden = 0
Video
KTVT-DT
Channel: 19
ATSC
19.45 Mbps
DEFAULT
04:36:48 PM
TS PIDs
PID Min Rate (kbps) Rate (kbps) Max Rate (kbps) Description
0 (0x0) 17.47 17.69 18.01 PAT (Program Association Table)
48 (0x30) 17.47 17.69 17.79 'MT (Program Map Table) program_number = 3
49 (0x31) 10383.67 11104.18 13345.83 meter stream (stream_type=0x02) Video MPEG-2, ITU-T Rec. H.262
52 (0x34) 394.17 394.23 396.25 udio AC-3: ATSC A/53 Audio (stream_type=0x81)
53 (0x35) 196.94 197.85 198.14 udio AC-3: ATSC A/53 Audio (stream_type=0x81)
64 (0x40) 17.47 17.69 17.79 'MT (Program Map Table) program_number = 4
65 (0x41) 1974.34 4024.15 4079.52 meter stream (stream_type=0x02) Video MPEG-2, ITU-T Rec. H.262
68 (0x44) 196.69 197.45 198.31 udio AC-3: ATSC A/53 Audio (stream_type=0x81)
80 (0x50) 17.47 17.69 17.79 'MT (Program Map Table) program_number = 5
81 (0x51) 1936.06 2874.73 4014.13 meter stream (stream_type=0x02) Video MPEG-2, ITU-T Rec. H.262
84 (0x54) 197.15 197.64 199.15 udio AC-3: ATSC A/53 Audio (stream_type=0x81)
8187 (0x1FFB) 52.08 52.68 53.27 \TSC tables (STT,MGT,RRT,VCT,DCCT,DCCSCT)
8191 (0x1FFF) 184.35 211.96 264.44 Null Packets
Channel: 24
ATSC
19.39 Mbps
DEFAULT
04:37:35 PM
Measures
POWER -71.7 dBm
C/N 26.8 dB
MER 21.2 dB
LM 6.3 dB
SER <1.0e-05
VBER 2.3e-08
TS Alarms - TR 101 290
Priority 1
1.1 TS Sync Loss (1)
1.2 Sync Byte (0)
1.3.A PAT (0)
1.4 Continuity (0)
1.5.A PMT (0)
1.6 PID (0)
Priority 2
2.1 Transport (0)
2.2 CRC (0)
2.3.A PCR Repetition (0)
2.3.B PCR Discont. (2)
2.4 PCR Accuracy (52)
2.5 PTS (0)
2.6 CAT (0)
Priority 3
3.1.A NIT Actual (0)
3.1.B NIT Other (0)
3.2 SI Repetition (0)
3.4 Unref PID (3)
3.5.A SDT Actual (0)
3.5.B SDT Other (0)
3.6.A EIT Actual (0)
3.6.B EIT Other (0)
3.6.C EIT PF (0)
3.7 RST (0)
3.8 TDT (0)
1.1 2.1 3.1.A
1.2 2.2 3.1.B 3.2
1.3.A 2.3.A 3.4.A 3.5.A
2.3.B 3.5.B
1.4 2.4 3.6.A
3.6.B
1.5.A 2.5 3.6.C
1.6 2.6 3.7 3.8
Start time: 16:33:19 Running time: 00:04:16 Span: 1 min
Video
KXAS-DT
Channel: 24
ATSC
19.39 Mbps

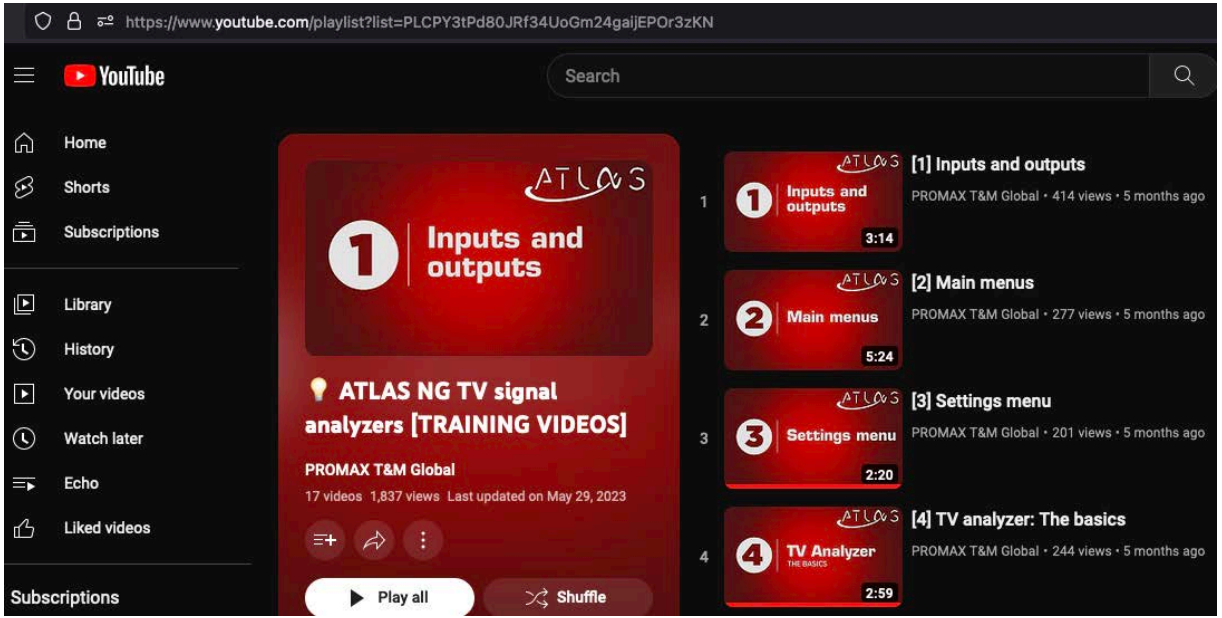
DEFAULT
10:16:23 AM
Measures
POWER -66.7 dBm
C/N 14.3 dB
MER 19.8 dB
LM 15.3 dB
CBER 5.2e-06
LBER <1.0e-07
Signal Parameters
Bandwidth 6000 KHz
FFT Mode 8K
Guard Interval Time 111.27 us
Code Rate 11/15
Spectral Inversion Off
Guard Interval 768
Constellation QPSK
BOOTSTRAP L1 BASIC L1 DETAIL PLP 0 PLP 1 SUBFRAME 0
MIMO 0 0x0
MISO 0 0x0
FFT size 16K 1 0x1
Reduced carriers 0 0x0
Guard Interval 768 4 0x4
Num. OFDM symbols 70 0x46
Scattered pilot pattern SP8_4 7 0x7
Scattered pilot boost 0 0x0
Bound. symbol first flag 1 0x1
Bound. symbol last flag 1 0x1
Video
Calambres
UNM2
Channel: 34
ATSC3 PLP: 0
1.03 Mbps

DEFAULT
10:16:32 AM
Measures
POWER -66.6 dBm
C/N 14.4 dB
MER 19.6 dB
LM 15.1 dB
CBER 5.4e-06
LBER <1.0e-07
Signal Parameters
Bandwidth 6000 KHz
FFT Mode 8K
Guard Interval Time 111.27 us
Code Rate 11/15
Spectral Inversion Off
Guard Interval 768
Constellation QPSK
BOOTSTRAP L1 BASIC L1 DETAIL PLP 0 PLP 1 SUBFRAME 0
Version 0 0x0
MIMO scattered pilot encoding 0 0x0
LLS flag 1 0x1
Time info flag 2 0x2
Return channel flag 0 0x0
PAPR reduction 0 0x0
Frame length mode 1 0x1
Time offset 6656 0x1a00
Additional samples 0 0x0
Num. Subframes 2 1 0x1
Video
SECRETO
UNM2
Channel: 34
ATSC3 PLP: 0
1.30 Mbps

DEFAULT
10:08:31 PM
Spectrum
103 dBuV
Echoes
Signal Parameters
Bandwidth 1536 KHz
Spectral Inversion Off
FFT Mode 4K
Guard Interval 1/4
Constellation DQPSK
Code Rate 2/3
Power (dBc) 0.0 -21.8 -26.3 -31.1
Delay (us) 0.0 4.3 5.9 8.0
Distance (Km) 0.0 1.3 1.8 2.4
195.92 MHz
DAB
MF2
0.00 Mbps


DEFAULT
06:24:58 PM
Measurement
POWER -61.3 dBm
C/N 35.2 dB
MER 22.8 dB
LM 5.8 dB
CBER 4.0e-02
LBER <1.0e-07
Signal Parameters
Bandwidth 6000 KHz
FFT Mode 16K
Guard Interval Time 148.17 us
Code Rate 9/15
Spectral Inversion Off
Guard Interval 1024
Constellation 256 QAM
BOOTSTRAP L1 BASIC L1 DETAIL PLP 0 SUBFRAME 0
LLS flat 1 0x1
Layer 0 0x0
Start 0 0x0
Size 1066000 0x10441
Scrambled type 0 0x0
FEC type BCH_LDPC_64K 1 0x1
MOD 256 QAM 3 0x3
COD 7 0x7
TI mode 1 0x1
FEC block start 0 0x0
Constellation
Channel: 24
ATSC3 PLP: 0
18.87 Mbps

18 ATLaS NG Training Videos on YouTube (to date):



TV testing

ATSC 3.0 nextgenTV

HEXYLON

- 3.3 GHz Spectrum Analyzer (even with Waterfall)
- ATSC 8VSB
- ATSC 3.0
- Satellite DVB-S/S2/S2X
- TSoIP
- QAM – J.83/B – incl. optical
- Analog, DVB-T/T2, ISDB-T(b)

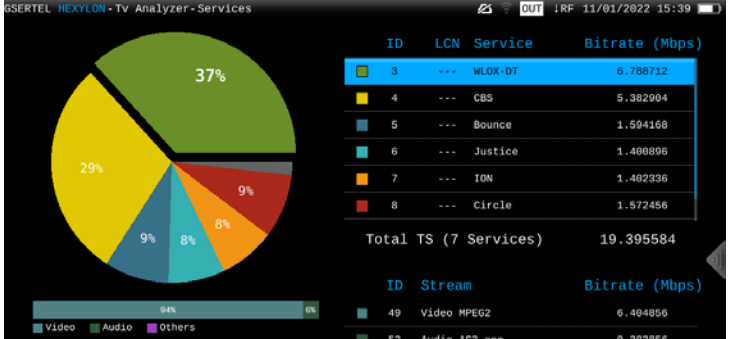
- HEVC 4K video
- WiFi (2.4 & 5.8 GHz)
- Advanced FM + RDS
- Remote control (VNC)

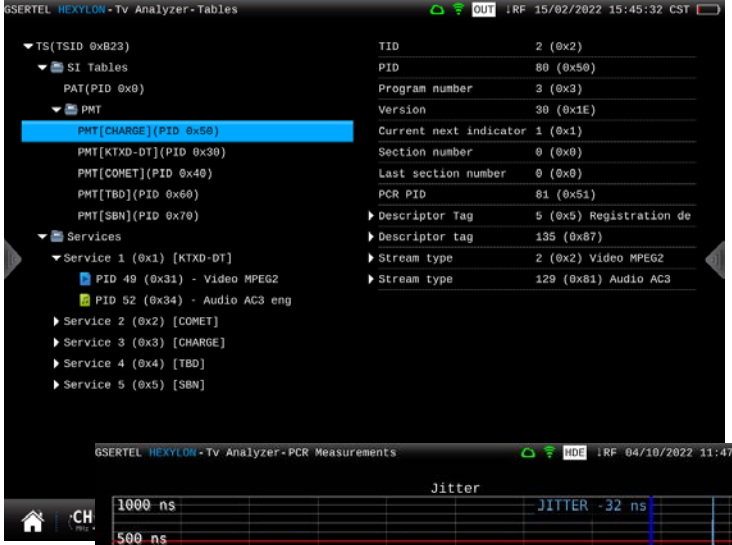
- TS analyzer / recorder
- RF recorder (25 MHz, 64GB)
- Drive test with GPS

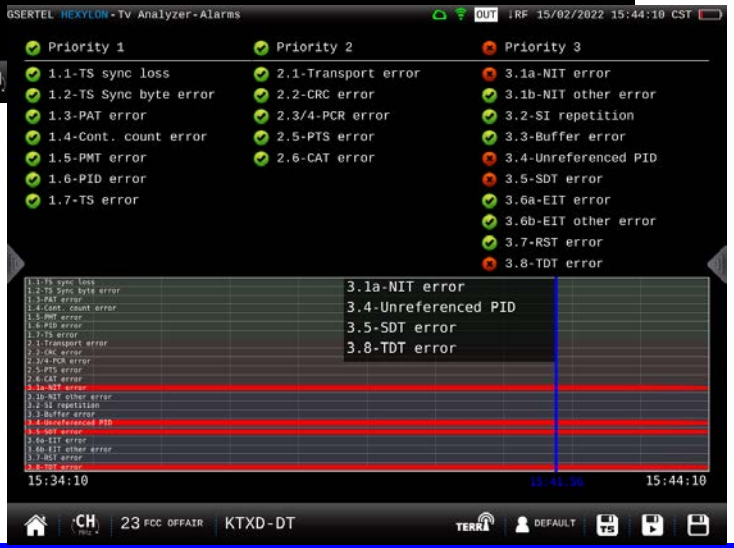
GSERTEL HEXYLON - Tv Analyzer
OUT
RF 17:57
Measurements
ATSC
E 123.0 dBµV/m
C/N 48.7 dB
LwSh 9.9 dB
UpSh >52.0 dB
MER 33.2 dB
PreBER <1.0E-6
PostBER <1.0E-8
Television
KTVT-DT
Parameters
Standard ATSC
BW 6.0 MHz
Constellation 8-VSB
Offset 0 MHz
Spectrum
110A
90
70
493.000MHz
503.000MHz
513.000MHz
CH
19 FCC OFFAIR
KTVT-DT
TERR
DEFAULT

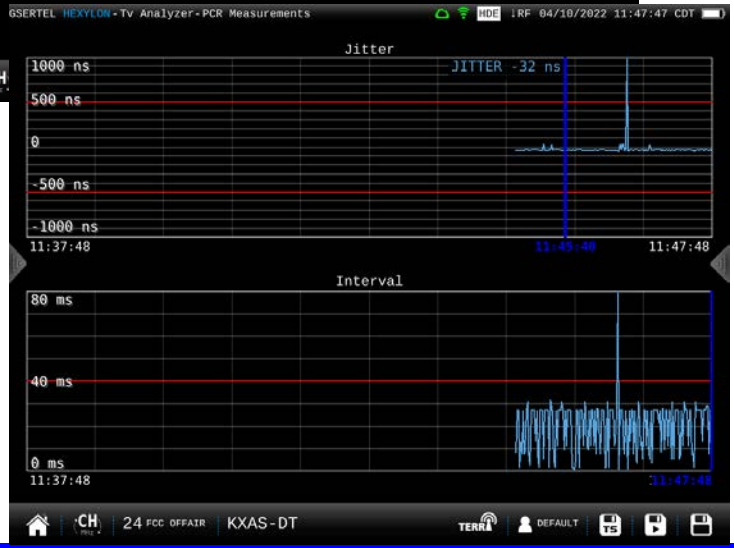
GSERTEL HEXYLON - Tv Analyzer
OUT
RF 17:58
Measurements
ATSC
E 123.0 dBµV/m
C/N 48.7 dB
LwSh 10.2 dB
UpSh >52.0 dB
MER 33.2 dB
PreBER <1.0E-6
PostBER <1.0E-8
Constellation
Television
KTVT-DT
Parameters
Standard ATSC
BW 6.0 MHz
Constellation 8-VSB
Offset 0 MHz
Services
74%
7%
8%
9%
KTVT-DT
Tables
TS(TSID 0xB17)
SI Tables
PMT
PAT(PID 0x0)
Services
CH
19 FCC OFFAIR
KTVT-DT
TERR
DEFAULT

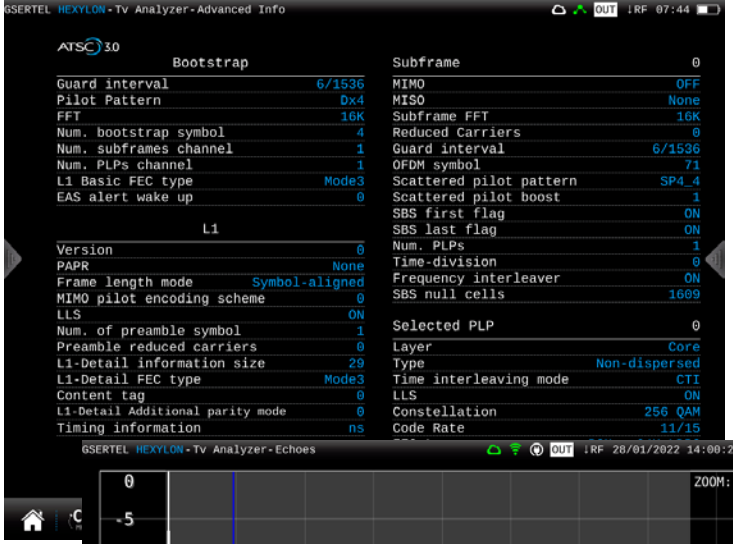
GSERTEL HEXYLON - Tv Analyzer - Constellation
OUT
RF 17:58
ATSC
E 123.0 dBµV/m
C/N 48.8 dB
LwSh 10.0 dB
UpSh >52.0 dB
MER 32.4 dB
PreBER <1.0E-6
PostBER <1.0E-8

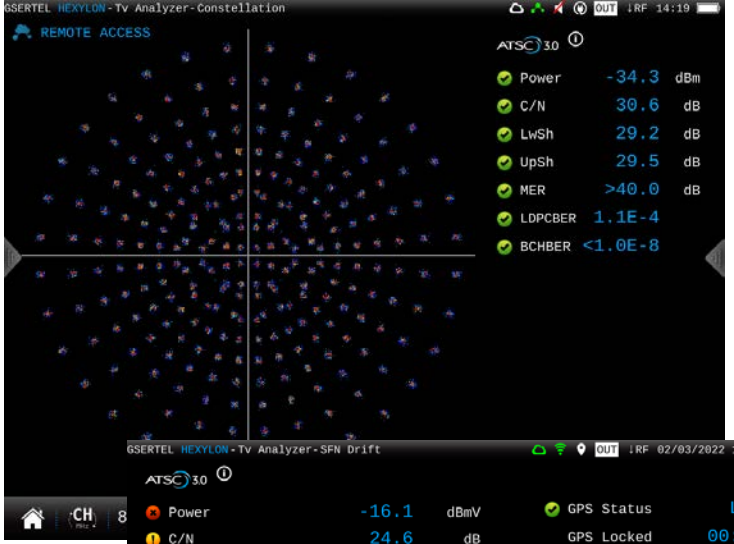

GSERTEL HEXYLON - Tv Analyzer - Services
OUT
RF 11/01/2022 15:39
37%
29%
9%
9%
8%
8%
94%
6%
Video
Audio
Others
ID LCN Service Bitrate (Mbps)
3 --- WLOX-DT 6.788712
4 --- CBS 5.382904
5 --- Bounce 1.594168
6 --- Justice 1.400896
7 --- ION 1.402336
8 --- Circle 1.572456
Total TS (7 Services) 19.395584
ID Stream Bitrate (Mbps)
49 Video MPEG2 6.404856
52 Audio AC3 eng 0.383856

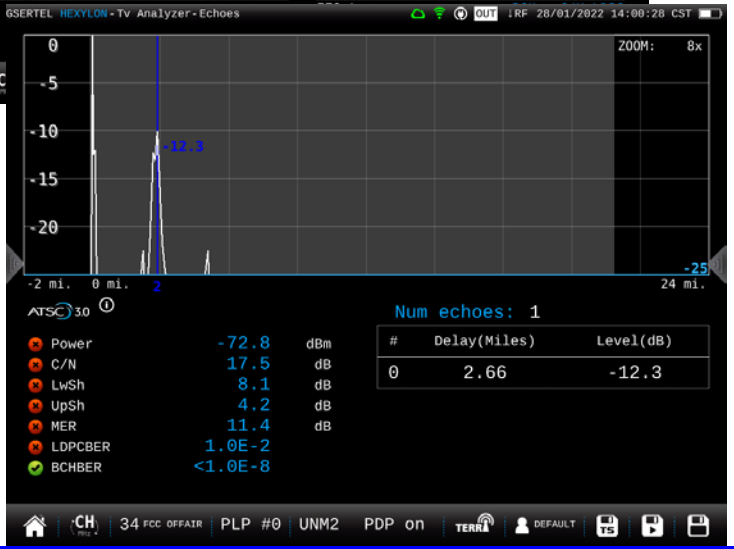

GSERTEL HEXYLON - Tv Analyzer - Tables
OUT
RF 15/02/2022 15:45:32 CST
TS(TSID 0xB23)
SI Tables
PAT(PID 0x0)
PMT
PMT[CHARGE](PID 0x50)
PMT[KTXD-DT](PID 0x30)
PMT[COMET](PID 0x40)
PMT[TBD](PID 0x60)
PMT[SBN](PID 0x70)
Services
Service 1 (0x1) [KTXD-DT]
PID 49 (0x31) - Video MPEG2
PID 52 (0x34) - Audio AC3 eng
Service 2 (0x2) [COMET]
Service 3 (0x3) [CHARGE]
Service 4 (0x4) [TBD]
Service 5 (0x5) [SBN]
TID 2 (0x2)
PID 80 (0x50)
Program number 3 (0x3)
Version 30 (0x1E)
Current next indicator 1 (0x1)
Section number 0 (0x0)
Last section number 0 (0x0)
PCR PID 81 (0x51)
Descriptor Tag 5 (0x5) Registration de
Descriptor tag 135 (0x87)
Stream type 2 (0x2) Video MPEG2
Stream type 129 (0x81) Audio AC3

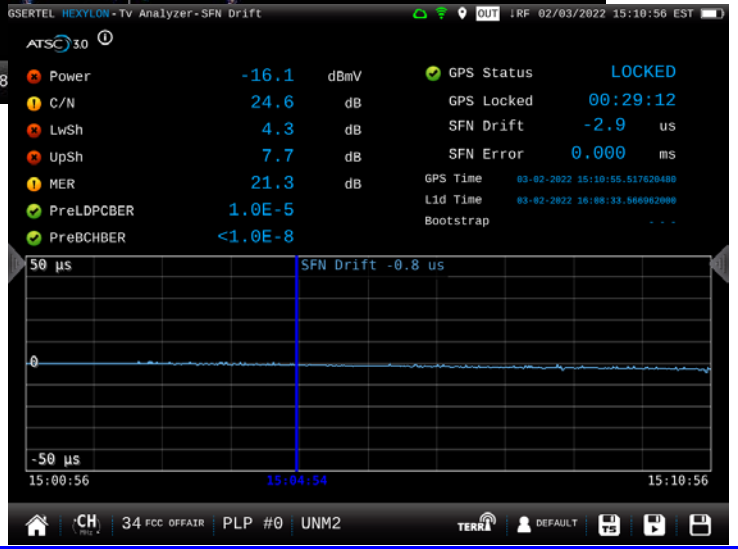

GSERTEL HEXYLON - Tv Analyzer - Alarms
OUT
RF 15/02/2022 15:44:10 CST
Priority 1
1.1-TS sync loss
1.2-TS Sync byte error
1.3-PAT error
1.4-Cont. count error
1.5-PMT error
1.6-PID error
1.7-TS error
Priority 2
2.1-Transport error
2.2-CRC error
2.3/4-PCR error
2.5-PTS error
2.6-CAT error
Priority 3
3.1a-NIT error
3.1b-NIT other error
3.2-SI repetition
3.3-Buffer error
3.4-Unreferenced PID
3.5-SDT error
3.6a-EIT error
3.6b-EIT other error
3.7-RST error
3.8-TDT error
3.1a-NIT error
3.4-Unreferenced PID
3.5-SDT error
3.8-TDT error
15:34:10
15:44:10
23 FCC OFFAIR
KTXD-DT
DEFAULT

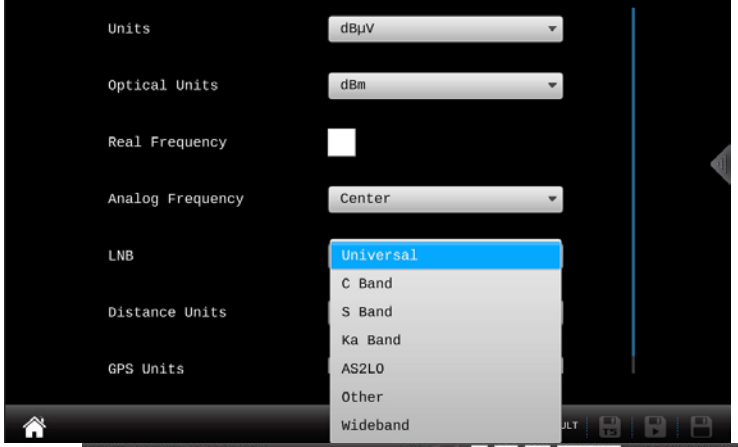

GSERTEL HEXYLON - Tv Analyzer - PCR Measurements
HDE
RF 04/10/2022 11:47:47 CDT
Jitter
JITTER -32 ns
1000 ns
500 ns
0
-500 ns
-1000 ns
11:37:48
11:47:48
Interval
80 ms
40 ms
0 ms
11:37:48
24 FCC OFFAIR
KXAS-DT
DEFAULT


GSERTEL HEXYLON-Tv Analyzer-Advanced Info
OUT RF 07:44
ATSC 3.0
Bootstrap
Guard interval 6/1536
Pilot Pattern Dx4
FFT 16K
Num. bootstrap symbol 4
Num. subframes channel 1
Num. PLPs channel 1
L1 Basic FEC type Mode3
EAS alert wake up 0
L1
Version 0
PAPR None
Frame length mode Symbol-aligned
MIMO pilot encoding scheme 0
LLS ON
Num. of preamble symbol 1
Preamble reduced carriers 0
L1-Detail information size 29
L1-Detail FEC type Mode3
Content tag 0
L1-Detail Additional parity mode 0
Timing information ns
Subframe 0
MIMO OFF
MISO None
Subframe FFT 16K
Reduced Carriers 0
Guard interval 6/1536
OFDM symbol 71
Scattered pilot pattern SP4_4
Scattered pilot boost 1
SBS first flag ON
SBS last flag ON
Num. PLPs 1
Time-division 0
Frequency interleaver ON
SBS null cells 1609
Selected PLP 0
Layer Core
Type Non-dispersed
Time interleaving mode CTI
LLS ON
Constellation 256 QAM
Code Rate 11/15


GSERTEL HEXYLON-Tv Analyzer-Constellation
OUT RF 14:19
REMOTE ACCESS
ATSC 3.0
Power -34.3 dBm
C/N 30.6 dB
LwSh 29.2 dB
UpSh 29.5 dB
MER >40.0 dB
LDPCBER 1.1E-4
BCHBER <1.0E-8

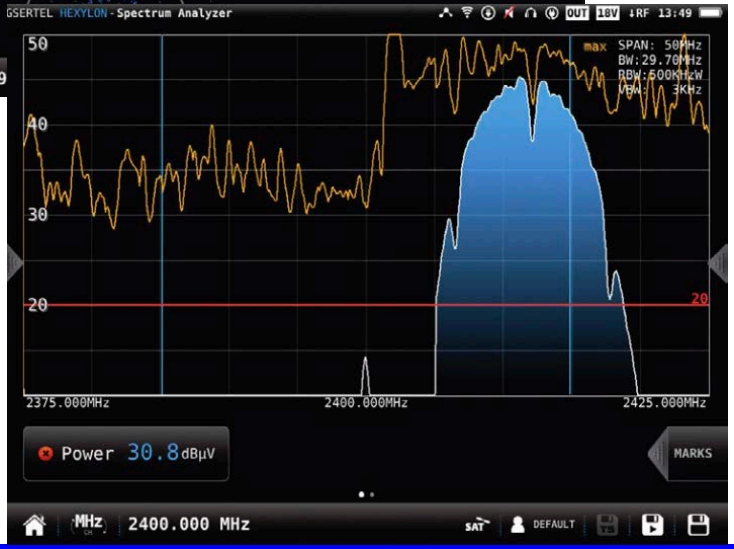

GSERTEL HEXYLON-Tv Analyzer-Echoes
OUT RF 28/01/2022 14:00:28 CST
ZOOM: 8x
0
-5
-10
-15
-20
-12.3
-25
-2 mi.
0 mi.
2
24 mi.
ATSC 3.0
Num echoes: 1
Delay(Miles) Level(dB)
0 2.66 -12.3
Power -72.8 dBm
C/N 17.5 dB
LwSh 8.1 dB
UpSh 4.2 dB
MER 11.4 dB
LDPCBER 1.0E-2
BCHBER <1.0E-8
34 FCC OFFAIR
PLP #0
UNM2
PDP on
TERRA
DEFAULT

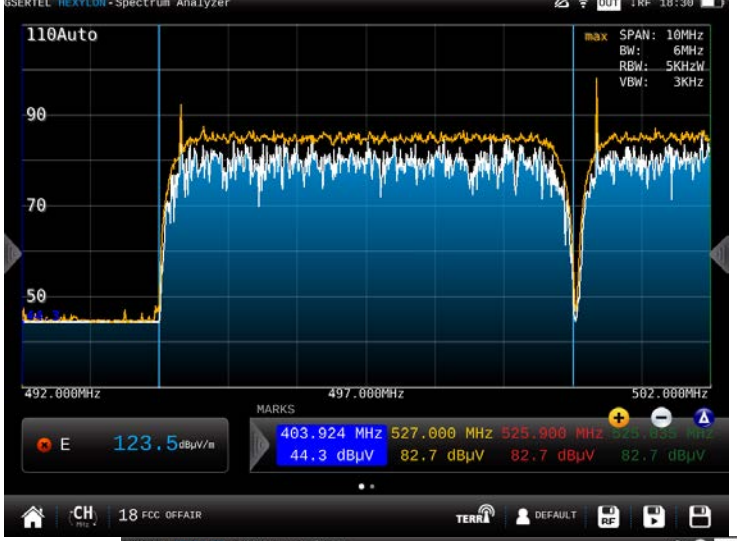

GSERTEL HEXYLON-Tv Analyzer-SFN Drift
OUT RF 02/03/2022 15:10:56 EST
ATSC 3.0
Power -16.1 dBmV
C/N 24.6 dB
LwSh 4.3 dB
UpSh 7.7 dB
MER 21.3 dB
PreLDPCBER 1.0E-5
PreBCHBER <1.0E-8
GPS Status LOCKED
GPS Locked 00:29:12
SFN Drift -2.9 us
SFN Error 0.000 ms
GPS Time 03-02-2022 15:10:55.517620480
L1d Time 03-02-2022 16:08:33.566962000
Bootstrap
50 µs
SFN Drift -0.8 us
0
-50 µs
15:00:56
15:04:54
15:10:56
34 FCC OFFAIR
PLP #0
UNM2
TERRA
DEFAULT

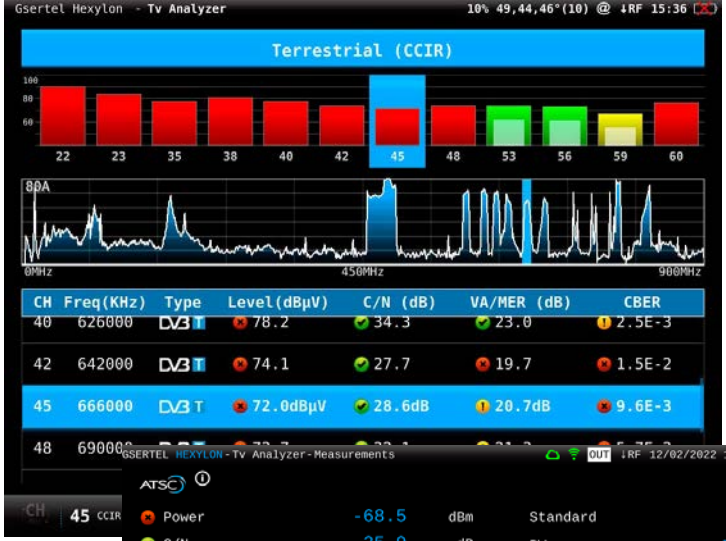

Units
dBµV
Optical Units
dBm
Real Frequency
Analog Frequency
Center
LNB
Universal
C Band
S Band
Ka Band
AS2LO
Other
Wideband
Distance Units
GPS Units

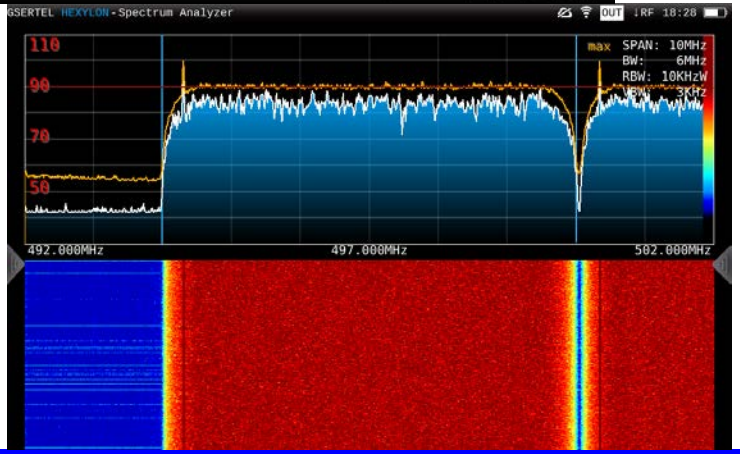
GSERTEL HEXYLON - Tv Analyzer - Constellation
ASTRA 1
19.2°E
Power 66.0 dBµV
C/N 15.2 dB
MER 13.4 dB
Link Margin 6.5 dB
LDPCBER 8.0E-5
BCHBER <1.0E-8
CH H49

GSERTEL HEXYLON - Tv Analyzer
Measurements
Power -51.3 dBm
C/N 16.1 dB
MER 16.1 dB
Link Margin 8.0 dB
LDPCBER 5.4E-6
BCHBER <1.0E-8
Parameters
Standard
BW 37.1 MHz
PLS n 0
PLS root 1
ISI Id #0
Constellation 8PSK
Code Rate 3/4
Symbol Rate 4164
Pilots OFF
Offset +3.0 MHz
Services
79%
21%
XHFAMX
Spectrum
Constellation
Television
11.81GHz 11.836 11.86GHz
XHFAMX
V5B Galaxy19
XHFAMX
SAT A
TEST

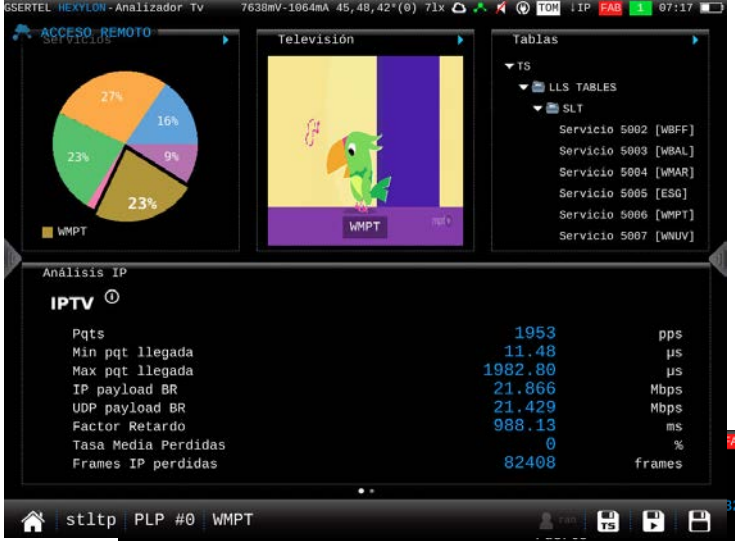

GSERTEL HEXYLON - Spectrum Analyzer
SPAN: 50MHz
BW:29.70MHz
RBW:500KHzW
VBW: 3KHz
50
40
30
20
2375.000MHz
2400.000MHz
2425.000MHz
Power 30.8 dBµV
MARKS
2400.000 MHz
DEFAULT

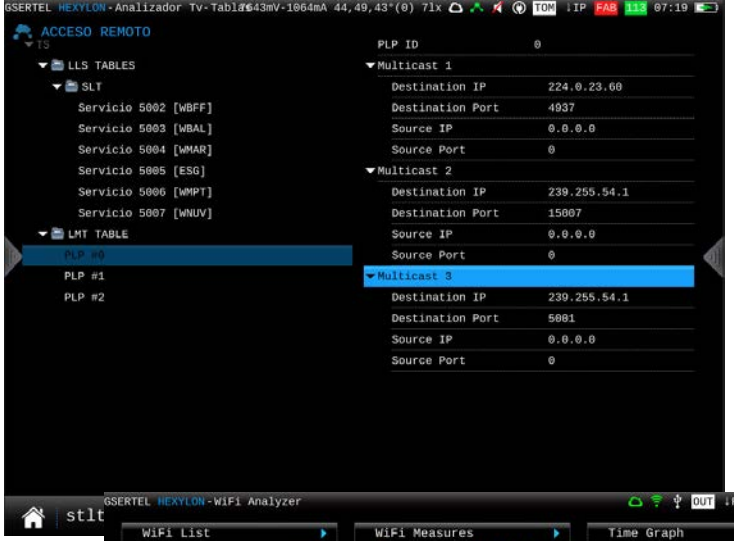

110Auto
max SPAN: 10MHz
BW: 6MHz
RBW: 5KHzW
VBW: 3KHz
90
70
50
492.000MHz
497.000MHz
502.000MHz
MARKS
E 123.5dBµV/m
403.924 MHz 527.000 MHz 525.900 MHz
44.3 dBµV 82.7 dBµV 82.7 dBµV
18 FCC OFFAIR
DEFAULT

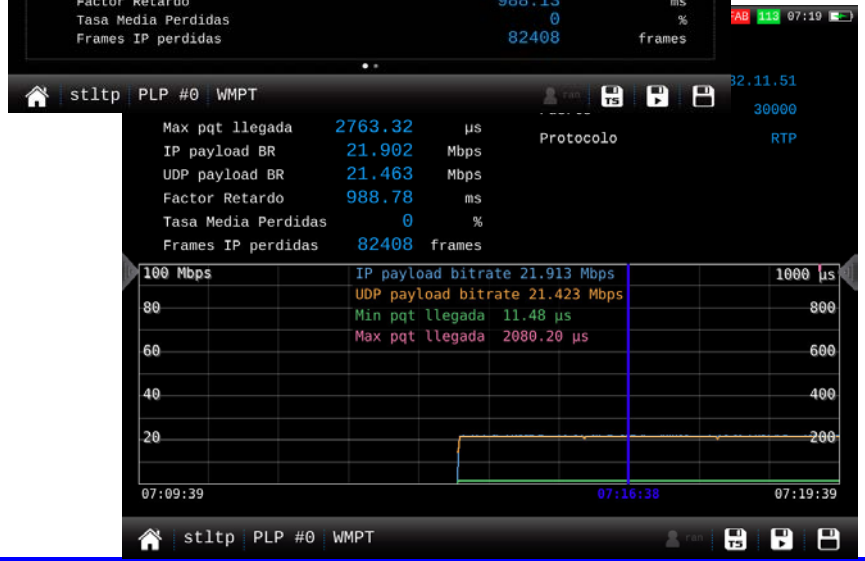

Gsertel Hexylon - Tv Analyzer
10% 49,44,46°(10) @ RF 15:36
Terrestrial (CCIR)
22 23 35 38 40 42 45 48 53 56 59 60
0MHz
450MHz
900MHz
CH Freq(KHz) Type Level(dBµV) C/N (dB) VA/MER (dB) CBER
42 642000 DVB T 74.1 27.7 19.7 1.5E-2
45 666000 DVB T 72.0dBµV 28.6dB 20.7dB 9.6E-3
48 690000
45 CCIR


GSERTEL HEXYLON-Spectrum Analyzer
RF 18:28
max SPAN: 10MHz
BW: 6MHz
RBW: 10KHzW
110
90
70
50
492.000MHz
497.000MHz
502.000MHz

GSERTEL HEXYLON-Tv Analyzer-Measurements
RF 12/02/2022 16:12:26 CST
ATSC
Power -68.5 dBm
C/N 25.9 dB
LwSh 31.9 dB
UpSh 29.4 dB
MER 23.6 dB
PreBER <1.0E-6
PostBER <1.0E-8
Standard ATSC
BW 6.0 MHz
Constellation 8-VSB
Offset +0.0 MHz
Power -67.7
C/N 26.9
MER 25.1
PreBER 1.0E-6
PostBER 1.0E-8
-27
-47
-67
-87
1.0E-8
1.0E-6
1.0E-4
1.0E-2
16:02:26
16:07:43
16:12:26
27 FCC OFFAIR KDFI-DT
DEFAULT

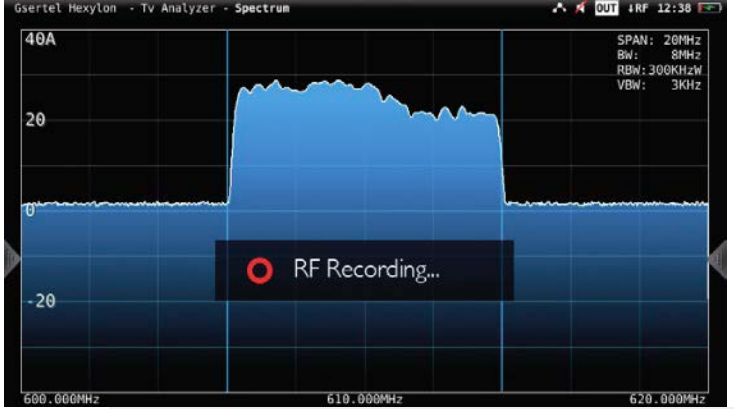

GSERTEL HEXYLON - Analizador Tv
ACCESO REMOTO
Televisión
Tablas
TS
LLS TABLES
SLT
Servicio 5002 [WBFF]
Servicio 5003 [WBAL]
Servicio 5004 [WMAR]
Servicio 5005 [ESG]
Servicio 5006 [WMPT]
Servicio 5007 [WNUV]
WMPT
Análisis IP
IPTV
Pqts 1953 pps
Min pqt llegada 11.48 µs
Max pqt llegada 1982.80 µs
IP payload BR 21.866 Mbps
UDP payload BR 21.429 Mbps
Factor Retardo 988.13 ms
Tasa Media Perdidas 0 %
Frames IP perdidas 82408 frames


GSERTEL HEXYLON - Analizador Tv-Tablas
ACCESO REMOTO
TS
LLS TABLES
SLT
Servicio 5002 [WBFF]
Servicio 5003 [WBAL]
Servicio 5004 [WMAR]
Servicio 5005 [ESG]
Servicio 5006 [WMPT]
Servicio 5007 [WNUV]
LMT TABLE
PLP #0
PLP #1
PLP #2
PLP ID 0
Multicast 1
Destination IP 224.0.23.60
Destination Port 4937
Source IP 0.0.0.0
Source Port 0
Multicast 2
Destination IP 239.255.54.1
Destination Port 15007
Source IP 0.0.0.0
Source Port 0
Multicast 3
Destination IP 239.255.54.1
Destination Port 5001
Source IP 0.0.0.0
Source Port 0


stltp PLP #0 WMPT
Max pqt llegada 2763.32 µs
IP payload BR 21.902 Mbps
UDP payload BR 21.463 Mbps
Factor Retardo 988.78 ms
Tasa Media Perdidas 0 %
Frames IP perdidas 82408 frames
Protocolo RTP
30000
100 Mbps
1000 µs
IP payload bitrate 21.913 Mbps
UDP payload bitrate 21.423 Mbps
Min pqt llegada 11.48 µs
Max pqt llegada 2080.20 µs
80
60
40
20
800
600
400
200
07:09:39
07:16:38
07:19:39
stltp PLP #0 WMPT

GSERTEL HEXYLON - WiFi Analyzer
WiFi List
Bloemenheuvel
SpectrumSetup-37_E...
WIFID52950
SpectrumSetup-37
ngHub_319441NX00943
FlyingCow
Linksys03312
WiFi Measures
Status Unlocked
Linksys03312
CH 4 2427 MHz
Level -84 dBm
Time Graph
WiFis: 15
Channel Map
Bloemenheuvel
Linksys03312
WIFID52950
1
3
5
7
9
11
13

HEXYLON
GSERTEL


Gsertel Hexylon - Tv Analyzer - Spectrum
OUT
RF 12:38
40A
SPAN: 20MHz
RBW: 8MHz
RBW: 300KHzW
VBW: 3KHz
20
0
-20
RF Recording...
600.000MHz
610.000MHz
620.000MHz

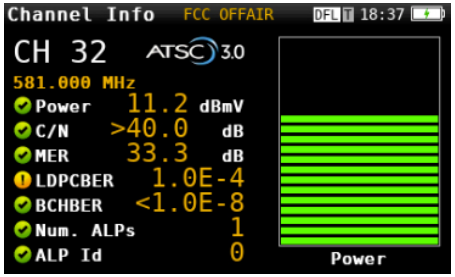
Closed Caption
ON
CC type
CEA608
>> Judge Judy: DO YOU HAVE THE
KDFI-DT
MORE27
www.more27.com
CH
27 FCC OFFAIR
KDFI-DT
TERRA
DEFAULT

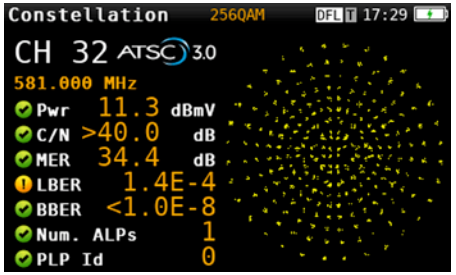
Low budget TV testing

H 3.0 Evolution

- 1 GHz Spectrum Analyzer
- ATSC 8VSB
- ATSC 3.0
- Remote control

Retrofittable options:
- ATSC 3.0
- HEVC
- TSoIP
- WiFi

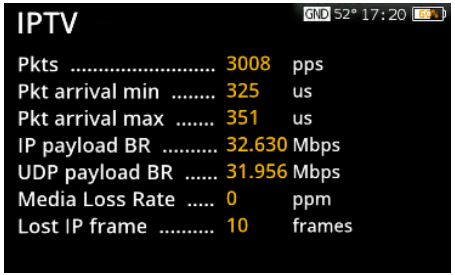

Channel Info FCC OFFAIR DFL T 18:37
CH 32 ATSC 3.0
581.000 MHz
Power 11.2 dBmV
C/N >40.0 dB
MER 33.3 dB
LDPCBER 1.0E-4
BCHBER <1.0E-8
Num. ALPs 1
ALP Id 0
Power


Constellation 256QAM DFL T 17:29
CH 32 ATSC 3.0
581.000 MHz
Pwr 11.3 dBmV
C/N >40.0 dB
MER 34.4 dB
LBER 1.4E-4
BBER <1.0E-8
Num. ALPs 1
PLP Id 0

H30 EVOLUTION
Screen Mirroring
Spectrum Span:200MHz
CH 26
514.000 MHz
Pwr dBµV 50.9
C/N dB 14.9

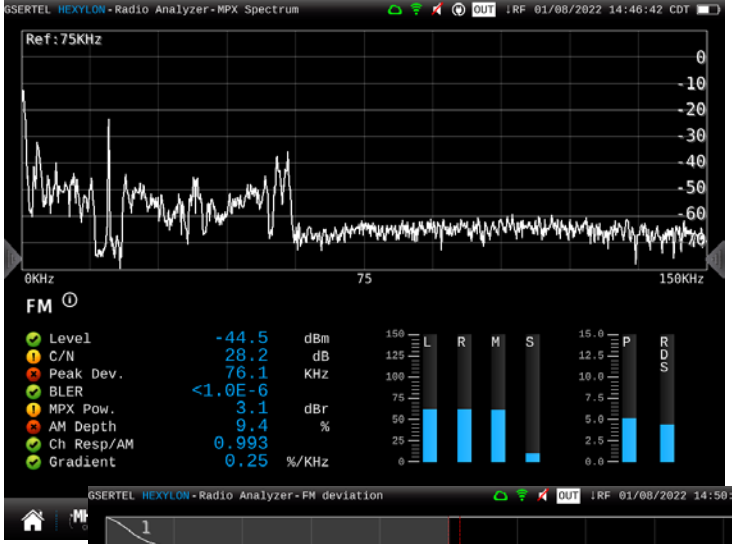
MPEG CUSTOM3 11:00PM

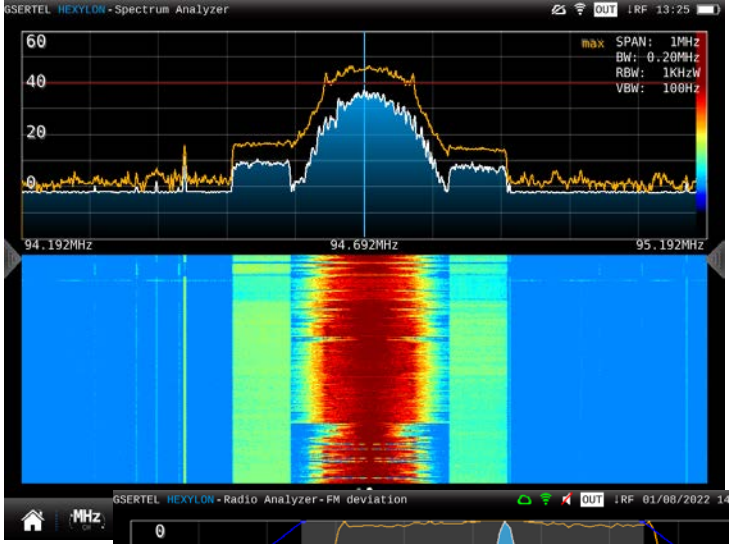
Spectrum Span:25MHz STB 01:26PM
CH 62
453.0000 MHz
Pwr dBmV -3.3
C/N dB 28.9
10
-10
-30

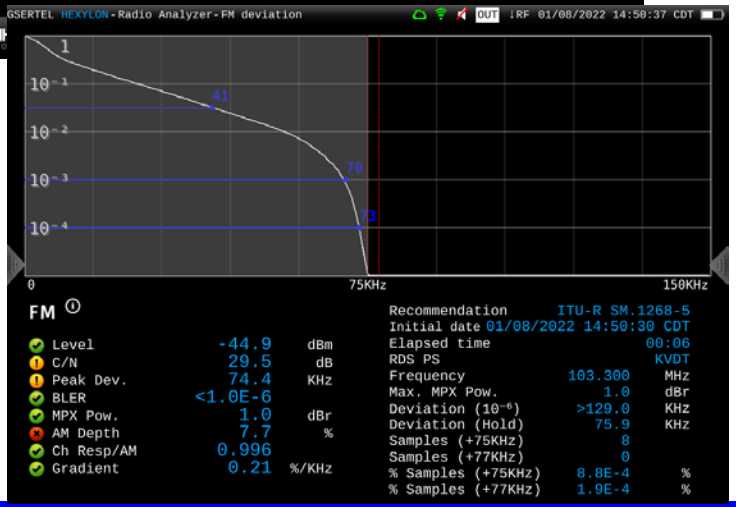

IPTV
GND 52° 17:20
Pkts ..... 3008 pps
Pkt arrival min ..... 325 us
Pkt arrival max ..... 351 us
IP payload BR ..... 32.630 Mbps
UDP payload BR ..... 31.956 Mbps
Media Loss Rate ..... 0 ppm
Lost IP frame ..... 10 frames

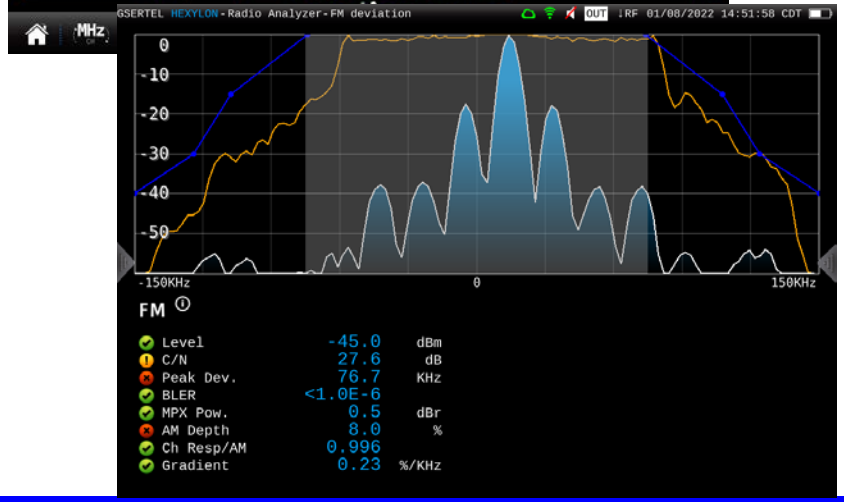
Constellation 8-VSB
CH 19 ATSC
503.000 MHz
Pwr -8.9 dBmV
C/N 22.7 dB
MER 26.6 dB
PRBER <1.0E-8
PTBER <1.0E-8

FM radio testing (+ RDS)

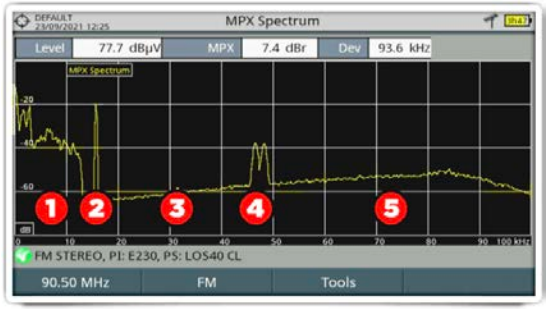

GSERTEL HEXYLON - Radio Analyzer - MPX Spectrum
OUT
RF 01/08/2022 14:46:42 CDT
Ref:75KHz
0
-10
-20
-30
-40
-50
-60
-70
0KHz
75
150KHz
FM
Level -44.5 dBm
C/N 28.2 dB
Peak Dev. 76.1 KHz
BLER <1.0E-6
MPX Pow. 3.1 dBr
AM Depth 9.4 %
Ch Resp/AM 0.993
Gradient 0.25 %/KHz
L
R
M
S
P
RDS


GSERTEL HEXYLON - Spectrum Analyzer
OUT
RF 13:25
max
SPAN: 1MHz
BW: 0.20MHz
RBW: 1KHzW
VBW: 100Hz
60
40
20
0
94.192MHz
94.692MHz
95.192MHz

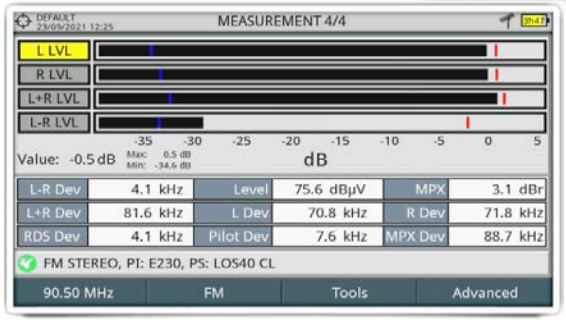

GSERTEL HEXYLON - Radio Analyzer - FM deviation
OUT
RF 01/08/2022 14:50:37 CDT
1
10⁻¹
10⁻²
10⁻³
10⁻⁴
41
70
73
0
75KHz
150KHz
FM
Level -44.9 dBm
C/N 29.5 dB
Peak Dev. 74.4 KHz
BLER <1.0E-6
MPX Pow. 1.0 dBr
AM Depth 7.7 %
Ch Resp/AM 0.996
Gradient 0.21 %/KHz
Recommendation ITU-R SM.1268-5
Initial date 01/08/2022 14:50:30 CDT
Elapsed time 00:06
RDS PS KVDT
Frequency 103.300 MHz
Max. MPX Pow. 1.0 dBr
Deviation (10⁻⁶) >129.0 KHz
Deviation (Hold) 75.9 KHz
Samples (+75KHz) 8
Samples (+77KHz) 0
% Samples (+75KHz) 8.8E-4 %
% Samples (+77KHz) 1.9E-4 %


GSERTEL HEXYLON - Radio Analyzer - FM deviation
OUT
RF 01/08/2022 14:51:58 CDT
0
-10
-20
-30
-40
-50
-150KHz
0
150KHz
FM
Level -45.0 dBm
C/N 27.6 dB
Peak Dev. 76.7 KHz
BLER <1.0E-6
MPX Pow. 0.5 dBr
AM Depth 8.0 %
Ch Resp/AM 0.996
Gradient 0.23 %/KHz

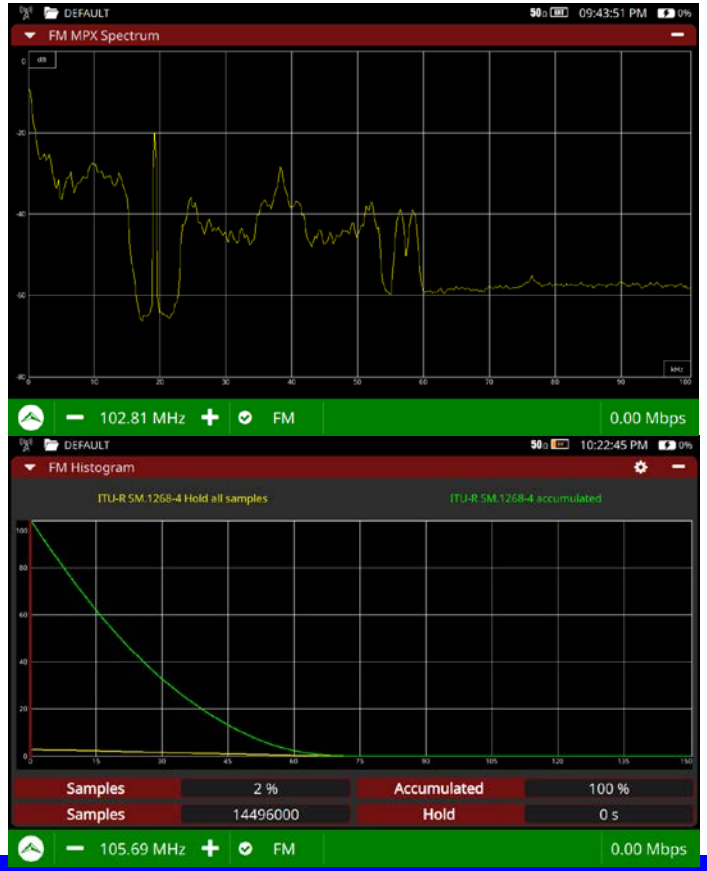
FM radio testing (+RDS)

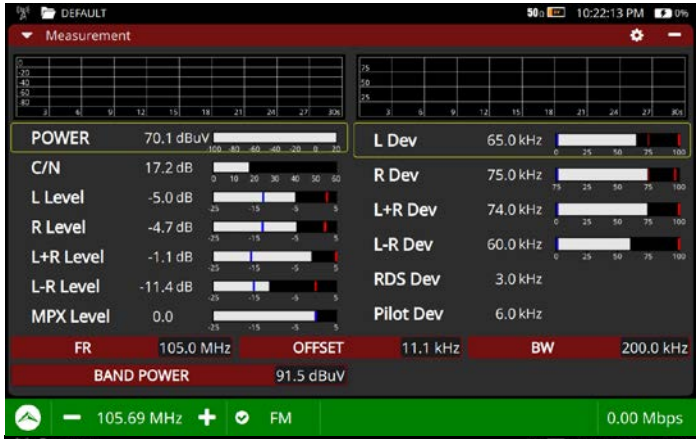


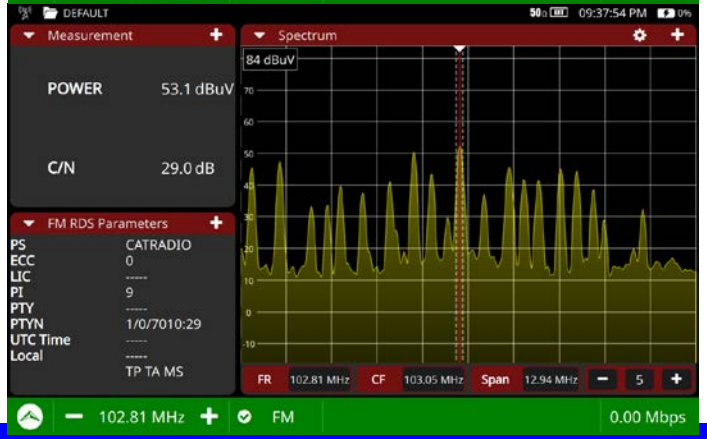
1. **L+R subcarrier**. This is what we listen in FM mono receivers.
2. **Stereo pilot**.
3. **L-R subcarrier:**. This information enables the stereo FM receivers to restore both audio channels.
4. **RDS subcarrier**.
5. **SCA services**: Reserved to encode information in many ways.



FM radio testing (+RDS)







Questions???

Thank you for your attention!

Tell all your friends about SOURCERER

Eddy Vanderkerken
SOURCERER LLC
EQUIPMENT

Phone: 214-912-5007
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