



WBA NUTS AND BOLTS 2022

FREE, CHEAP TOOLS FOR REMOTE MONITORING OF ANYTHING

A BIT OF HISTORY...





AND NOW...

WHAT HAS CHANGED?

- Equipment is much more reliable than the good ole days
- One engineer for multiple stations, sometimes multiple cities
- Al Gore's most famous invention

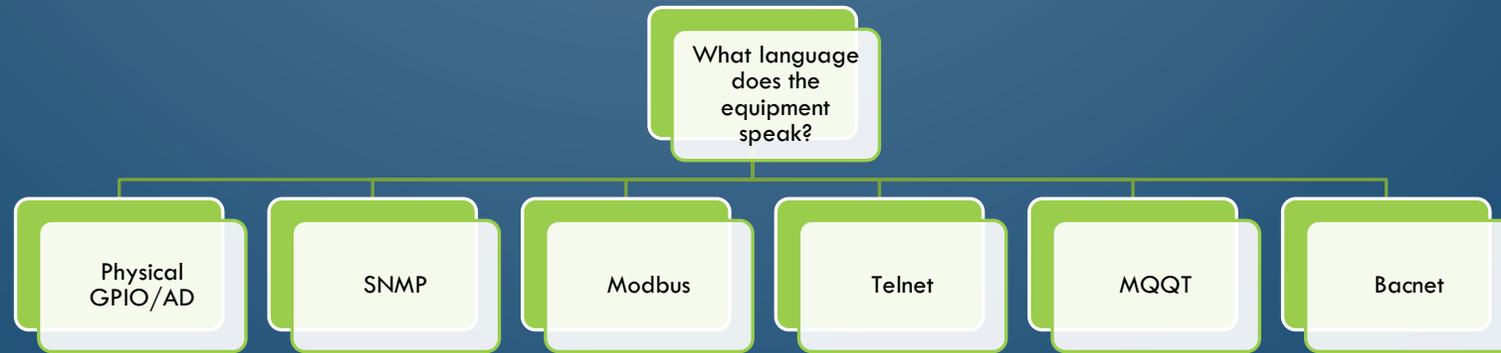
So, Just how do you monitor multiple types of equipment that speak multiple languages, in multiple cities?

- Commercial products are starting to appear
- Many remote controls have web interfaces
 - Security concerns
- What if you don't have a big budget?
 - Have we got a show for you...

The dashboard provides a detailed overview of the transmitter's operational status. Key components include:

- Video Feed:** A live view of the NX50 transmitter rack.
- Status Grid:** A grid of indicators for various systems, including DX-50 Status, STL Status, Antenna System Status, Building Status, Intraplex Status, and PPM Status.
- Power and Temperature:** Graphs and data points for Forward Power (31.2 kW), Reflected Power (82 w), Peak Envelope Power (117 kW), and various temperatures (Ambient, Rectifier, Average High Cube Temp).
- Summary Section:** Large indicators for '50 Kw MDCL (AES 1)', 'Carrier OK', 'PEP System Active', 'Check Engine', 'Programming Normal', 'PEP Enabled', and 'Transmitter Site'.

DESIGN PREREQUISITES



DESIGN DESIRES



MODULAR



OPEN
SOURCE



RELIABLE



SECURE



WEB BASED
UI



LOW COST

ONE SOLUTION TO THE PROBLEM



WARNING – This is a
work in progress (aren't
they all?)



Data Collectors

Icinga2
SNMP Collector
Node Red



Data Storage

InfluxDb



Data Display

Grafana

Data Collector Details (lifted directly from the WWW)

- Icinga2

[Icinga](#) is a monitoring system which checks the availability of your network resources, notifies users of outages, and generates performance data for reporting

Scalable and extensible, Icinga can monitor large, complex environments across multiple locations

Icinga 2 is the monitoring server and requires [Icinga Web 2](#) on top in your Icinga Stack. The configuration can be easily managed with either the [Icinga Director](#), config management tools or plain text within the [Icinga DSL](#)

- SNMPCollector

[SnmCollector](#) is a full featured Generic SNMP data collector with Web Administration Interface Open Source tool which has as main goal simplify the configuration for getting data from any device which snmp protocol support and send resulting data to an influxdb backend.

- Node Red

[Node-RED](#) is a programming tool for wiring together hardware devices, APIs and online services in new and interesting ways.

It provides a browser-based editor that makes it easy to wire together flows using the wide range of nodes in the palette that can be deployed to its runtime in a single-click.

Data Storage Details

- InfluxDb

InfluxDB is an open-source time series database developed by the company InfluxData. It is written in the Go programming language for storage and retrieval of time series data in fields such as operations monitoring, application metrics, events, logs, traces – from everywhere – systems, sensors, queues, databases and networks – and store in a high-performing engine capable of ingesting millions of data points per second.

Data Display Details

- Grafana

Grafana is a multi-platform open-source analytics and interactive visualization web application. It provides charts, graphs, and alerts for the web when connected to supported data sources. It is expandable through a plug-in system. End users can create complex monitoring dashboards using interactive query builders

SNMPCollector - CUMULUS CHICAGO

Runtime

LIST

Filter all columns 9 Results

Status: 9 Active 0 Deactivated

	ID	TagMap	SysDesc	#Meas	#Metrics	Get.Errs	M.Errs	G.Time	F.Time	SetActive	SnmpReset
   	Nielsen PPM Encoder - WLS AM Tinley	PPM Encoder=Nielsen PPM Encoder - WLS AM Tinley	Linux ArbAnaDig 2.6.37-AnaDig1212 #2 PREEMPT Thu Jun 8 09:20:00 EDT 2017 armv5telj	1	7	0	0	732 ms	0 ns		Reset
   	TP Wegener i8640	Satellite RX=TP Wegener i8640	Linux ipump405759 3.0.0-19-generic #33-Ubuntu SMP Thu Apr 19 19:05:57 UTC 2012 i686	1	10	4	0	4 ms	0 ns		Reset
   	WLS AM NX-50	NX Transmitter=WLS AM NX-50	Linux debian 2.6.34.13 #9 SMP PREEMPT Thu Oct 18 14:53:45 ADT 2012 i686	1	85	0	0	12 ms	0 ns		Reset
   	WLS AM TX - IP STL 1 Card 1	STL=WLS AM TX - IP STL 1 Card 1	Oslo AoIP	1	3	0	0	45 ms	0 ns		Reset
   	WLS AM TX - IP STL 1 Card 2	STL=WLS AM TX - IP STL 1 Card 2	Oslo AoIP	1	3	0	0	63 ms	0 ns		Reset
   	WLS AM TX - IP STL 1 Card 3	STL=WLS AM TX - IP STL 1 Card 3	Oslo AoIP	1	3	0	0	42 ms	0 ns		Reset
   	WLS AM TX - IP STL 1 Card 4	STL=WLS AM TX - IP STL 1 Card 4	Oslo AoIP	1	3	0	0	44 ms	0 ns		Reset
   	WLS AM TX - IP STL 2 Card 1	STL=WLS AM TX - IP STL 2 Card 1	Oslo AoIP	1	3	0	0	45 ms	0 ns		Reset
   	WLS AM TX - IP STL 2 Card 2	STL=WLS AM TX - IP STL 2 Card 2	Oslo AoIP	1	3	0	0	47 ms	0 ns		Reset

SNMPCOLLECTOR WEB INTERFACE

PORT 8090

The screenshot displays the Node-RED web interface for a project named "XDS Satellite 5-8". The main workspace contains a complex flow starting with an inject node, followed by a function node "ABC Studio" which sends a query string to XDS. The data is then processed through several "Split" nodes: "Split Port Data" (4 branches for Port A, B, C, D), "Split Temp Data" (1 branch), "Split Tuner Data" (6 branches for EbNo, AGC, RS Errors, RF Freq, Lock Status, LO Drift), and "Split Pwr Data" (5 branches for 1.2V, 1.8V, 3.3V, 5.0V, 12.0V Supply). Each branch includes a "Parse Data Fields" node, an "Add" field node, and a corresponding output node. The flow concludes with a "Wait 7 Seconds" node. The interface includes a sidebar with node categories, a top navigation bar, and a right-hand panel showing the flow list and details for the selected flow.

NODE-RED WEB INTERFACE

PORT 1880

The screenshot displays the Icinga2 Web Interface dashboard. On the left, a dark sidebar contains navigation options: Dashboard (selected), Problems, Overview, History, and Documentation. The main content area is divided into several sections:

- Current Incidents:** Overdue, Muted.
- Service Problems:** No services found matching the filter.
- Host Problems:** No hosts found matching the filter.
- Recently Recovered Services:** A list of services that have returned to an OK state, including:
 - ping4 on WLS AM Tinley - IP STL Ping (Card 6)
 - Icinga Web 2 on tp-node-red
 - IP Receive Failure on WLS AM TX - IP STL 1 Card 1
 - Win C-Drive on Tim Wright Tinley
 - Win MEM on Tim Wright Tinley
 - Desktop Window Manager Process on Tim Wright Tinley
 - Win CPU on Tim Wright Tinley
 - Win CPU on Burk Autopilot Tinley
 - Desktop Window Manager Process on Burk Autopilot Tinley
 - Win MEM on Burk Autopilot Tinley
- Overview:**
 - Host Summary:** 0 Hosts Down, 32 Up.
 - Service Summary:** 0 Services Critical, 143 Ok.

At the bottom left, the user 'tim.wright' is logged in, and there are settings and back icons.

Icinga2 Web Interface

Port 80 addr/icingaweb2

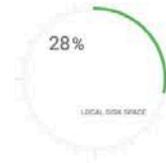
Webmin Dashboard

Search

- Webmin
- System
- Servers
- Tools
- Networking
- Hardware
- Cluster
- Un-used Modules
- Refresh Modules

administrator

System Information



System hostname: ip-node-red (10.10.89.45)
 Webmin version: 2.000
 Time on system: Monday, August 29, 2022 1:36 PM
 Processor information: Intel(R) Core(TM) i3-4160 CPU @ 3.60GHz, 4 cores
 System uptime: 4 days, 21 hours, 00 minutes
 CPU load averages: 3.59 (1 min) 3.21 (5 mins) 3.23 (15 mins)
 Virtual memory: 0 bytes used / 7.99 GiB total
 Package updates: ● package updates are available

Operating system: Ubuntu Linux 20.04.4
 Authentic theme version: 20.00
 Kernel and CPU: Linux 5.4.0-125-generic on x86_64
 Drive temperatures: sda: 104°F
 Running processes: 187
 Real memory: 3.16 GiB used / 11.96 GiB cached / 17.48 GiB total
 Local disk space: 56.91 GiB used / 140.33 GiB free / 197.25 GiB total

Stats History



Recent Logins

Network Interfaces

Webmin Web Interface
 https Port 10000

General / GPIO Node 227-2 (Rack 7)

GPIO Node 227-2

	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5
GPI 1	PEP Active	PEP to Processing	PEP Bypassed		
GPI 2		Generator Running	PPM Alarm	Sump Alarm	Edison Temp Alarm
GPI 3	Intraplex 1 Selected	Intraplex 2 Selected	APT IP Selected	950 RF Selected	
GPI 4	Intraplex 2 Yellow Alarm	Intraplex 1 Yellow Alarm	UPS Alarm		
GPI 5	Aux Antenna Ready	Fire Alarm	Gate Open	Garage Door Open	EF 3 Runnin
GPI 6	Carrier Alarm				

Links

- AES Node 127-0 (Rack 7)
- AES Node 127-1 (Rack 7)
- Analog Node 127-2 (Rack 7)
- Analog Node 127-3 (Rack 7)
- Analog Node 127-4 (Rack 7)
- Analog Node 127-5 (Rack 7)
- Analog Node 127-6 (Rack 7)

General / Analog Node 128-1 (Rack 9)

Analog Node 128-1

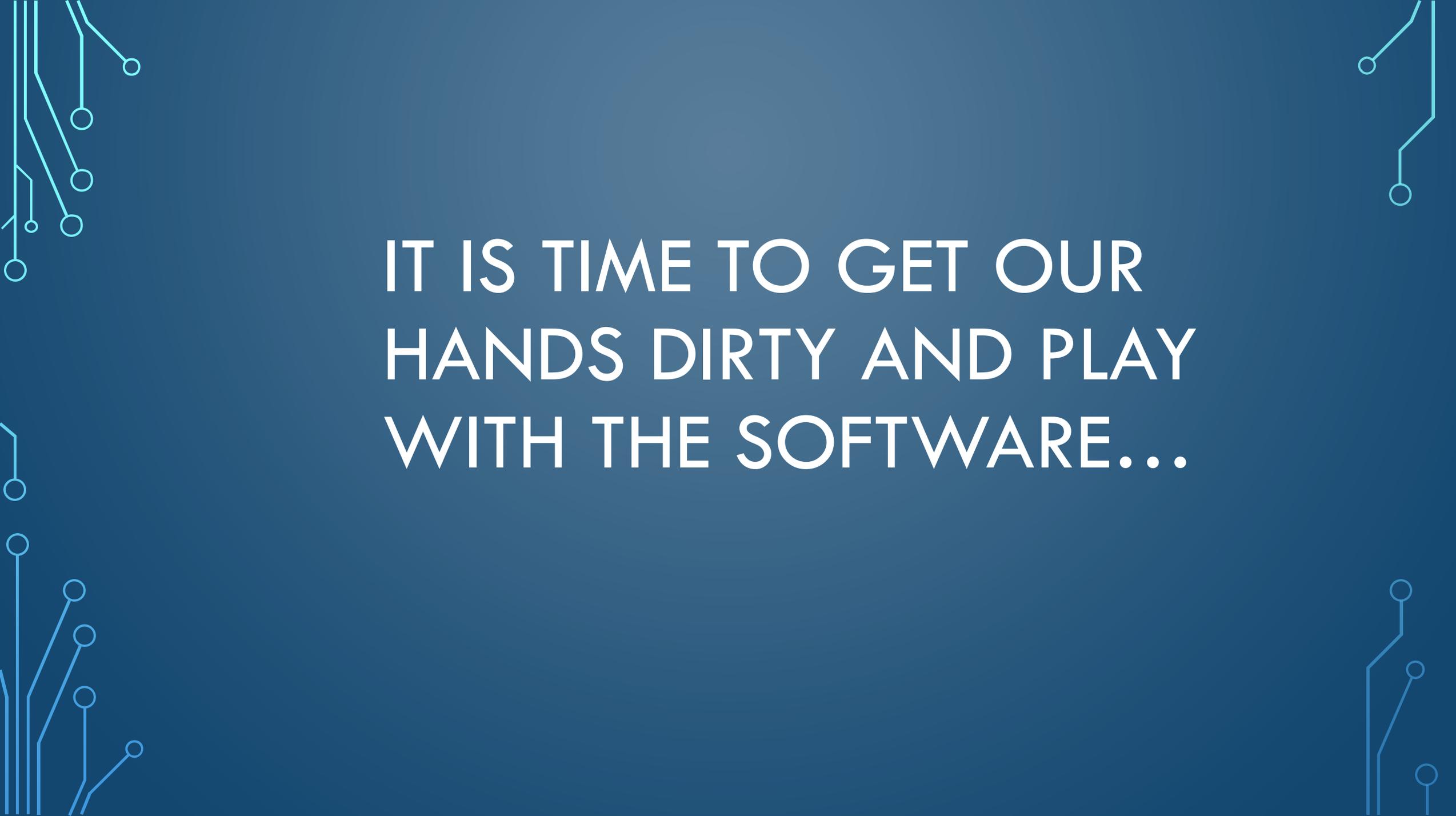
	Source	Destination	DST Route
1	HF 9100 Output	BE AM Stereo	239.192.50.12
2	TFT Monitor	Rack 9 Analog 2	DA 1 - IP STL@Node-127-9
3	Rack 9 Analog 3	Rack 9 Analog 3	DA 3 - T1-1@Node-127-9
4	Rack 9 Analog 4	HF 9100 Input	239.192.49.58
5	Rack 9 Analog 5	Rack 9 Analog 5	No Route
6	Rack 9 Analog 6	Rack 9 Analog 6	No Route
7	Rack 9 Analog 7	Rack 9 Analog 7	No Route
8	Two Tone Out	Two Tone In	HF Radio 4@FEMA-Shelter-2

Links

- AES Node 127-0 (Rack 7)
- AES Node 127-1 (Rack 7)
- Analog Node 127-2 (Rack 7)
- Analog Node 127-3 (Rack 7)
- Analog Node 127-4 (Rack 7)
- Analog Node 127-5 (Rack 7)
- Analog Node 127-6 (Rack 7)
- Analog Node 127-7 (Rack 7)
- Analog Node 127-8 (Rack 7)
- Analog Node 128-0 (Rack 9)
- Analog Node 128-1 (Rack 9)
- GPIO Node 227-0 (Rack 7)
- GPIO Node 227-1 (Rack 7)
- GPIO Node 227-2 (Rack 7)
- GPIO Node 227-3 (Rack 9)
- GPIO Node 227-4 (Shop)
- WLS-AM Heads Up

Grafana Dashboards

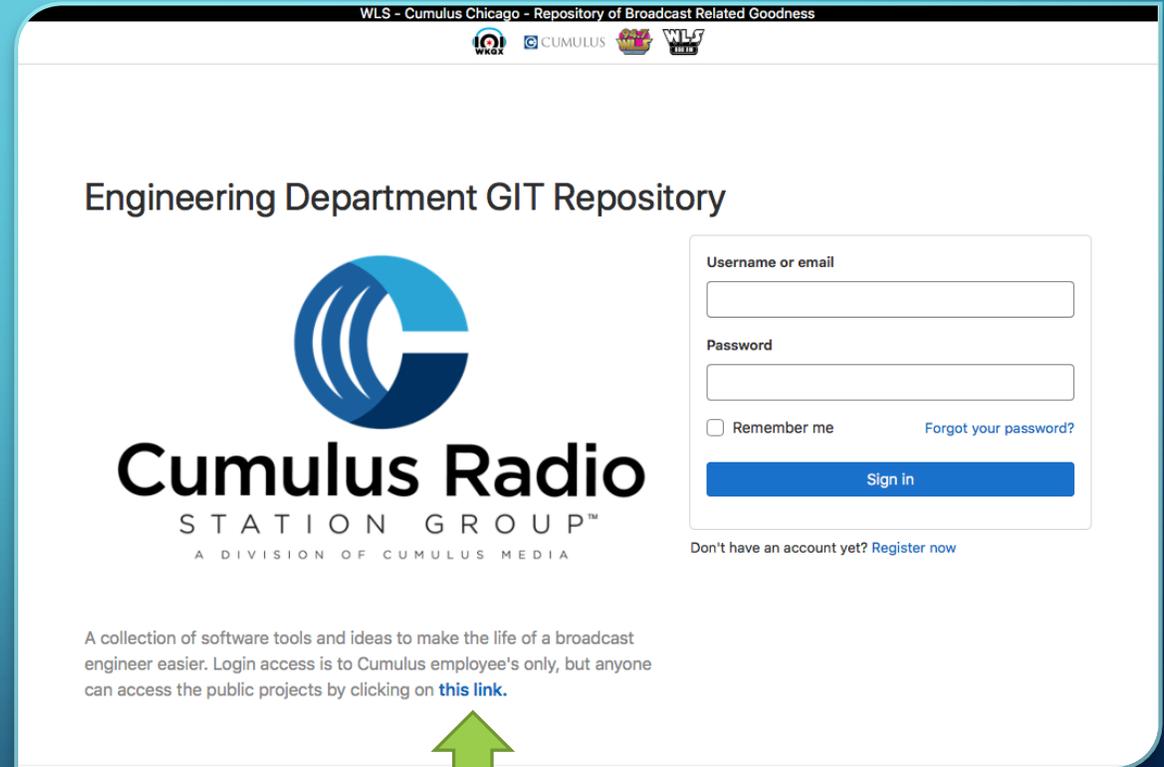
Looking at Axia xNode data

The image features a dark blue background with white, stylized circuit board traces in the corners. These traces consist of straight lines that turn at right angles and terminate in small circles, resembling electronic components or nodes. The traces are located in the top-left, top-right, bottom-left, and bottom-right corners, framing the central text.

IT IS TIME TO GET OUR
HANDS DIRTY AND PLAY
WITH THE SOFTWARE...

Resource page for this project and
more engineering goodness

<http://wlsgit.dyndns.org>



The screenshot shows a web browser window with the following content:

- Browser tab: WLS - Cumulus Chicago - Repository of Broadcast Related Goodness
- Browser address bar: wlsgit.dyndns.org
- Page title: Engineering Department GIT Repository
- Logo: Cumulus Radio STATION GROUP™ A DIVISION OF CUMULUS MEDIA
- Login form:
 - Username or email:
 - Password:
 - Remember me
 - [Forgot your password?](#)
 -
- Registration link: [Don't have an account yet? Register now](#)
- Footer text: A collection of software tools and ideas to make the life of a broadcast engineer easier. Login access is to Cumulus employee's only, but anyone can access the public projects by clicking on [this link](#).

Click here to access the Public files



IP Address list for the hands-on demo

- **192.168.2.10** - Raspberry Pi audio switcher (xNode output 4)
- **192.168.2.100** - Laptop running 7 instances of VLC, Wheatnet Navigator, Livewire audio driver.
- **192.168.2.101** - Wheatstone IP-88a
- **192.168.2.102** - Axia Analog xNode
- **192.168.2.103** - Axia GPIO xNode
- **192.168.2.200** - Laptop running Data Ingress and Database
- **192.168.2.201** - Laptop running a local Grafana Instance
- **192.168.2.202** - Laptop running a local Grafana Instance
- **192.168.2.203** - Laptop running a local Grafana Instance

How is it all put together?

