



# NW Digital Radio

## The Changing Role of Radio Networking in Amateur Radio

MicroHAMS Digital Conference 2014  
Bryan Hoyer - K7UDR

# The Great San Juan Fiber Cut of 2013

---

- 911 Service is lost
- Mainland and InterIsland Phones gone
- Banks/ATMs/Gas Stations are down
- Cell Service is hit/miss
- Burglar/Fire/Medical Alert gone
- Merchants can't process credit cards
- Pharmacies have no FAX for prescriptions

# continued

---

- Voice mail is inoperative
- DSL Customers gone
- Visitors can't confirm reservations
- Businesses have no Email
- Major Retailers can't place orders
- Repair people can't communicate
- Airport AWOS is down

# Emergency Communications?

---

- Or Communications Emergency
- Fire Stations take up Dispatch
- Hams communicate Inter-island

# Battlefield Network

---

- There is no infrastructure
- Multiple Nodes
  - Mobile
  - They come and go

# Requirements

---

- Fault Tolerant
- Self Configuring
- Self Healing
- Mobile Ad-Hoc Network

# Hybrid Network

---

- A Mixture of:
  - Internet accessibility
  - Amateur Radios Infrastructure
  - Amateur Radio Point Solutions

# 5 Apps for the Network

---

- Winlink > email
- BBS > newsgroup
- APRS > SMS + LBS
- dropbox bitsync?
- a little web access



# What's with Forms

COMMUNICATIONS RESOURCE AVAILABILITY WORKSHEET						Frequency Band		Description	
						VHF		COUNTYWIDE GROUP #1 (EXAMPLE)	
	Channel Configuration	Channel Name/Trunked Radio System Talkgroup	Eligible Users	RX Freq N or W	RX Tone/NAC	TX Freq N or W	Tx Tone/NAC	Mode A, D or M	Remarks
1	Repeater Pair	DISPATCH	County fire	151.0250 W	156.7	160.1050 W	156.7	A	Repeater on Mt. High
2	Simplex - B/M	TACTICAL 1	County fire	154.3850 N	none	Simplex	179.9	A	
3	Simplex - Mo only	TACTICAL 2	County fire	156.0450 N	none	Simplex	179.9	A	
4	Simplex - Mo only	TACTICAL 3	County fire	153.8150 N	none	Simplex	179.9	A	
5	Simplex - Mo only	TACTICAL 4	County fire	153.8300 N	none	Simplex	179.9	A	
6	Simplex - Mo only	TACTICAL 5	County fire	153.8000 N	NAC293	Simplex	NAC293	D	P25 digital
7	Repeater	COMMAND 1	County public safety	155.8200 N	136.5	153.8300 N	156.7	A	Backup repeater system
8	Repeater	EAST CONTROL	City fire	158.7750 N	141.3	154.3250 N	141.3	A	
9	Repeater	WEST CONTROL	City 2 fire	158.7350 N	100.0	154.4150 W	100.0	A	
10	Repeater	SO. CONTROL	City 3 fire	155.2500 N	110.9	155.8500 N	110.9	A	
11	Simplex - Mo only	STATE TAC	State fire	151.0150 N	none	Simplex	none	A	
12	Simplex - B/M	STATE MA1	All fire	154.2800 W	none	Simplex	none	A	Fire Interoperability calling
13	Simplex - Mo only	STATE MA2	All fire	154.2650 W	none	Simplex	none	A	Fire Interoperability tactical
14	Simplex - Mo only	STATE MA3	All fire	154.2950 W	none	Simplex	none	A	Fire Interoperability tactical
15	Simplex - Mo only	INTEROP 4	State public safety	159.0700 W	none	Simplex	none	A	
16	Repeater Pair	DISPATCH	County fire	151.0250 W	156.7	160.1050 W	156.7	A	Repeater on Mt. High-same as Ch#1

# HTML Form + Data

---

## COMMUNICATIONS RESOURCE AVAILABILITY WORKSHEET

Frequency Band: 2m, Description: San Juan County ACS

Channel Configuration	Channel Name/Trunked Radio System Talkgroup	Eligible Users	RX Freq N or W	RX Tone/NAC	TX Freq N or W	Tx Tone/NAC	Mode A,D or M	Remarks
Repeater Pair	Cady	Amateur	145.2500 W	131.8	144.6500 W	131.8	A	Cady Mtn SJCARS
Repeater Pair	N7JN C	Amateur	145.2500 N		144.6500 N		D	Hillview Terrace D-STAR
Repeater Pair	Conny	Amateur	146.7400 W	103.5	146.1400 W	103.5	A	Mt Constitution MBaRC
Simplex	NCF	Amateur	145.2500 W		144.6500 W		A	National Calling Frequency
Simplex	TAC-11	Amateur	145.2500 W	131.8	144.6500 W	131.8	A	Local County Use

The convention calls for frequency lists to show four digits after the decimal place, followed by either an N or a W, depending on whether the frequency is narrow or wide band. Mode refers to either A or D indicating analog or digital (e.g. Project 25) or M indicating mixed mode. All channels are shown as if programmed in a control station, mobile or portable radio. Repeater and base stations must be programmed with the Rx and Tx reversed.

[ICS-217a Form](#)

# Results

---

- The Form in PDF 27kB
- The Data in CSV 500B
- HTML “Form” 2kB
- 10:1 Data Reduction
- 50:1 if we pre-share the form
- 1200bps = 60kbps

# Markdown

```
1 ## COMMUNICATIONS RESOURCE AVAILABILITY WORKSHEET
2
3 **** Frequency Band: 2m
4 **** Description: San Juan County ACS
5 - Type some Markdown text in the left window
6 - See the HTML in the right
7 - Magic
8
9
10
11 Markdown is a lightweight markup language based on the formatting conventions
12 that people naturally use in email. As [John Gruber] writes on the [Markdown
13 site] [1]:
14 > The overriding design goal for Markdown's
15 > formatting syntax is to make it as readable
16 > as possible. The idea is that a
17 > Markdown-formatted document should be
18 > publishable as-is, as plain text, without
19 > looking like it's been marked up with tags
20 > or formatting instructions.
21 This text you see here is actually written in Markdown! To get a feel for
22 Markdown's syntax, type some text into the left window and watch the results in
the right.
```

## COMMUNICATIONS RESOURCE AVAILABILITY WORKSHEET

**Frequency Band: 2m** Description: San Juan County ACS

- Type some Markdown text in the left window
- See the HTML in the right
- Magic

Markdown is a lightweight markup language based on the formatting conventions that people naturally use in email. As [John Gruber](#) writes on the [Markdown site](#):

The overriding design goal for Markdown's formatting syntax is to make it as readable as possible. The idea is that a Markdown-formatted document should be publishable as-is, as plain text, without looking like it's been marked up with tags or formatting instructions.

This text you see here is *actually* written in Markdown! To get a feel for Markdown's syntax, type some text into the left window and watch the results in the right.

### Version

2.0

# UDRX-440

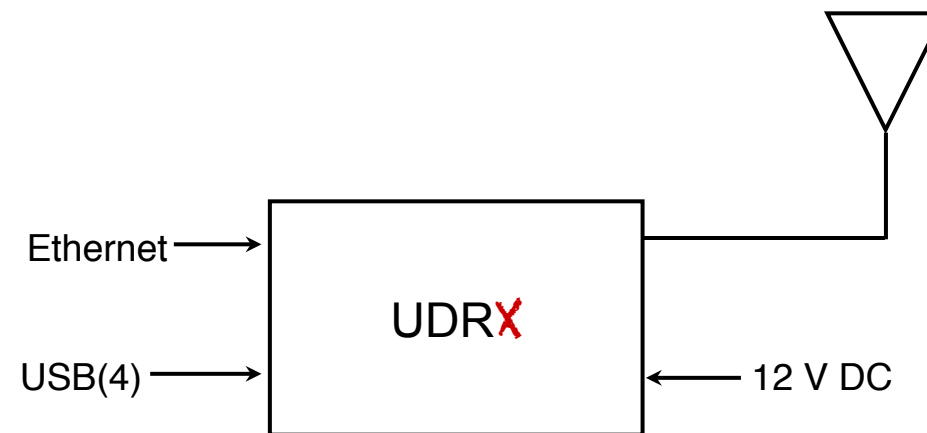
## Universal Digital Radio

Maximum Data Rate > 100kbps!

---

### Features:

- 25 W, 70 cm Transceiver
  - Open Source Linux Platform
- Add your own apps
- Packet and D-STAR
  - Browser Interface over Ethernet
- Control from any Device
- 4 USB Host Ports to add:  
GPS  
WiFi: Infrastructure or AP  
Telemetry/WX  
External Radio via TNC  
Storage

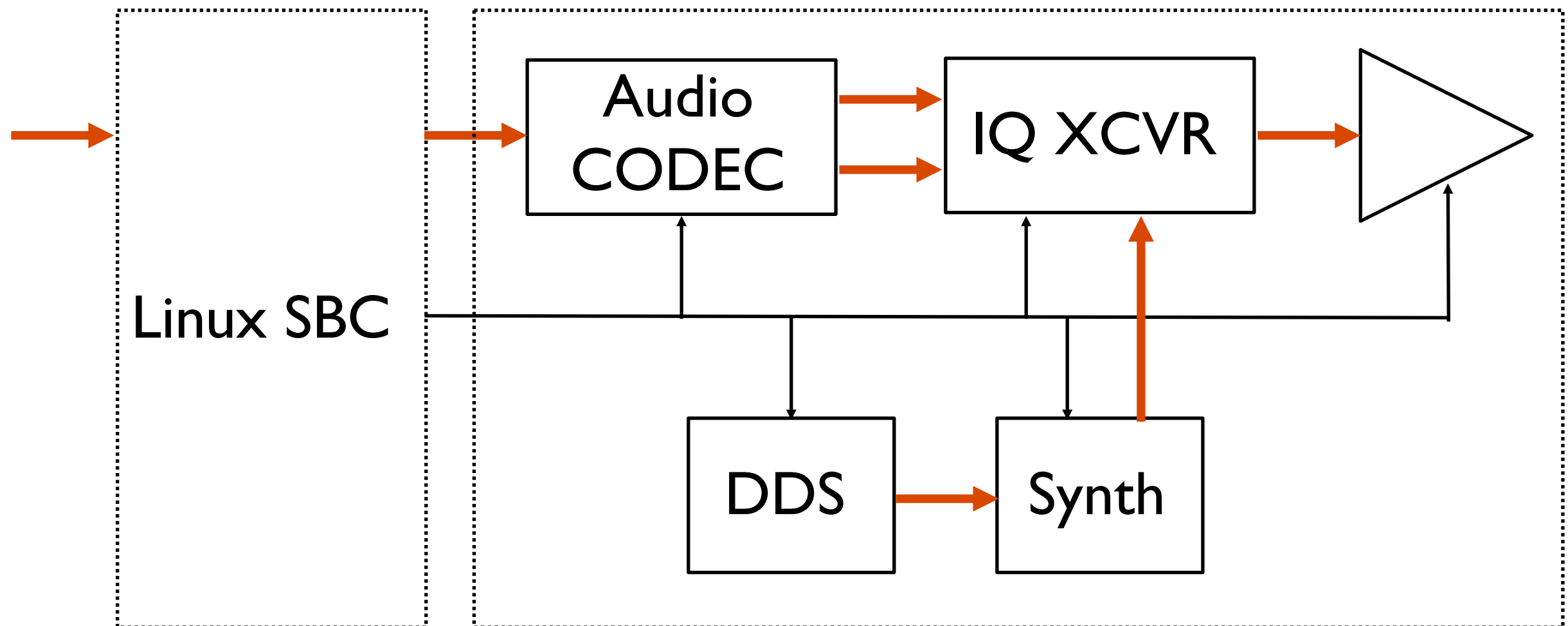


### Applications:

- Winlink Client, Gateway
- APRS Tracker, IGate
- D-STAR Gateway
- D-STAR DD Digital Data  
DV w AMBE Card Option
- Ad-Hoc Networking

# HW Block Diagram UDR~~X~~

Transmit Only





UDRX x

nwdig.net:57331/nodeUI/

Apps Google Maps News SanJuan Food Shop NWDR Python Aviation K7UDR on GPS Other Bookmarks

**NW Digital Radio** Recv  Tran  K7UDR

Name	Mode	CallSign	Option 1	Option 2	Frequency	DUP	Pwr	Save	Test
Location	AX.25	CallSign	opt1	opt2	440.800	+5	10W	Save	↻

---

Login

Channels

Winlink

Spy

APRS

Settings

Help

## You are connected to the NW Digital UDRX

Transmitting from this radio requires a Licensed Amateur Radio Operator.  
Please sign in with your callsign, which will be used to identify your transmissions.

**Callsign**

**Password**

UTC	Temp	VDC	GPS	TX	RX	Retrys	Msgs	WX	EnPkts	Err
Sat, 29 Mar 2014 16:33:53 GMT	30.5	12.6	48.05.31:-123:00:05	0	0	0	0	0	0	0

UDRX x

nwdig.net:57331/nodeUI/

Apps Google Maps News SanJuan Food Shop NWDR Python Aviation K7UDR on GPS Other Bookmarks

**NW Digital Radio** Recv Tran K7UDR

Name Mode CallSign Option 1 Option 2 Frequency DUP Pwr Save Test

blaine AX.25 W7ASC-11 KE7KML digi 444.123 +5 25W Save

Login

Channels

Winlink

Spy

APRS

Settings

Help

Ch	Name	Mode	Sign	Opt 1	Opt 2	Freq	Dup	Pwr	
<input type="checkbox"/>	Edmonds	D-Star	NW7DR B	CQCQCQ	NW7DR G	440.0125	+5	25	<input type="checkbox"/>
<input type="checkbox"/>	Hillview	D-Star	N7JN B			442.4625	-5	25	<input type="checkbox"/>
<input type="checkbox"/>	Vancouver WA	AX25	K7GJT-10			441.525	none	10	<input type="checkbox"/>
<input type="checkbox"/>	Vusario	AX25	JNBBS			440.85	none	10	<input type="checkbox"/>
<input checked="" type="checkbox"/>	blaine	AX25	W7ASC-10	KE7KML	digi	444.123	+5	25	<input type="checkbox"/>
<input type="checkbox"/>	cady	AX25	N7JN-10	digi	digi	444.321	none	5	<input type="checkbox"/>
<input type="checkbox"/>	port angeles	D-Star	W7ASC-10	digi	digi	444.123	+5	25	<input type="checkbox"/>
<input type="checkbox"/>	victoria	NETWORK	VE7RAH	KE7KML	digi	446.323	-5	10	<input type="checkbox"/>

UTC Sat, 29 Mar 2014 16:33:53 GMT Temp VDC GPS 30.5 12.6 48.05.31:-123:00:05 TX RX Retrys Msgs WX EnPkts Err 0 0 0 0 0 0 0



UDRX x

nwdig.net:57331/nodeUI/

Apps Google Maps News SanJuan Food Shop NWDR Python Aviation K7UDR on GPS Other Bookmarks

**NW Digital Radio** Recv Tran K7UDR

Name	Mode	CallSign	Option 1	Option 2	Frequency	DUP	Pwr	Save	Test
blaine	AX.25	W7ASC-11	KE7KML	digi	444.123	+5	25W	Save	↻

---

Login

Channels

**Winlink**

Spy

APRS

Settings

Help

Outbox (0)	WL2K display
Connect via radio	Listening...
Connect via network	
Cancel	

UTC	Temp	VDC	GPS	TX	RX	Retrys	Msgs	WX	EnPkts	Err
Sat, 29 Mar 2014 16:33:53 GMT	30.5	12.6	48.05.31:-123:00:05	0	0	0	0	0	0	0

nwdig.net:57331/nodeUI/#winlink-tab

UDRX x

nwdig.net:57331/nodeUI/


Apps Google Maps News SanJuan Food Shop NWDR Python Aviation K7UDR on GPS Other Bookmarks

**NW Digital Radio** Recv Tran K7UDR

Name	Mode	CallSign	Option 1	Option 2	Frequency	DUP	Pwr	Save	Test
blaine	AX.25	W7ASC-11	KE7KML	digi	444.123	+5	25W	Save	Test

---


[APRS](#)
[MSG](#)
[CTRL](#)
[Debug](#)

N7NIX-3 via BALDI 

Set path to TEMP1-1,WIDE2-1 to digi

1:VE7SFU-10 70mi NE	5:VE7CBH-6 62mi N
2:VA7DXH-1 78mi N	6:SKAGIT 15mi NE
3:BALDI 10 sec	7:VA7GH-9 75mi N
4:VE7BSA 47mi N	8:145.25sji 32mi N

status

0 0 

No Call : Reason

<b>UTC</b>	<b>Temp</b>	<b>VDC</b>	<b>GPS</b>	<b>TX</b>	<b>RX</b>	<b>Retrys</b>	<b>Msgs</b>	<b>WX</b>	<b>EnPkts</b>	<b>Err</b>
Sat, 29 Mar 2014 16:33:53 GMT	30.5	12.6	48.05.31:-123:00:05	0	0	0	0	0	0	0

nwdig.net:57331/nodeUI/#aprs-tab

UDRX x

nwdig.net:57331/nodeUI/

Apps Google Maps News SanJuan Food Shop NWDR Python Aviation K7UDR on GPS Other Bookmarks

**NW Digital Radio** Recv Tran K7UDR

Name	Mode	CallSign	Option 1	Option 2	Frequency	DUP	Pwr	Save	Test
blaine	AX.25	W7ASC-11	KE7KML	digi	444.123	+5	25W	Save	↻

---

[Login](#)
[Channels](#)
[Winlink](#)
[Spy](#)
[APRS](#)
[Settings](#)
[Help](#)

Network Servers Mail

Hostname:

DHCP  
 Static

IP Address:

Subnet Mask:

Router:

UTC	Temp	VDC	GPS	TX	RX	Retrys	Msgs	WX	EnPkts	Err
Sat, 29 Mar 2014 16:33:53 GMT	30.5	12.6	48.05.31:-123:00:05	0	0	0	0	0	0	0

nwdig.net:57331/nodeUI/#servers-tab

UDRX

nwdig.net:57331/nodeUI/

Apps Google Maps News SanJuan Food Shop NWDR Python Aviation K7UDR on GPS Other Bookmarks

**NW Digital Radio** Recv Tran K7UDR

Name	Mode	CallSign	Option 1	Option 2	Frequency	DUP	Pwr	Save	Test
blaine	AX.25	W7ASC-11	KE7KML	digi	444.123	+5	25W	Save	↻

---

**Login**

**Channels**

**Winlink**

**Spy**

**APRS**

**Settings**

**Help**

## UDRX Help

click a topic...

- About UDRX
 

IP adress, and other stuff about UDRX... Anim pariatur cliche reprehent heard of them accusamus labore susta.
- Network
- Packet
- DSTAR

**UTC** Sat, 29 Mar 2014 16:33:53 GMT

**Temp VDC GPS** 30.5 12.6 48.05.31:-123:00:05

**TX RX Retrys Msgs WX EnPkts Err** 0 0 0 0 0 0 0

nwdig.net:57331/nodeUI/#help-tab