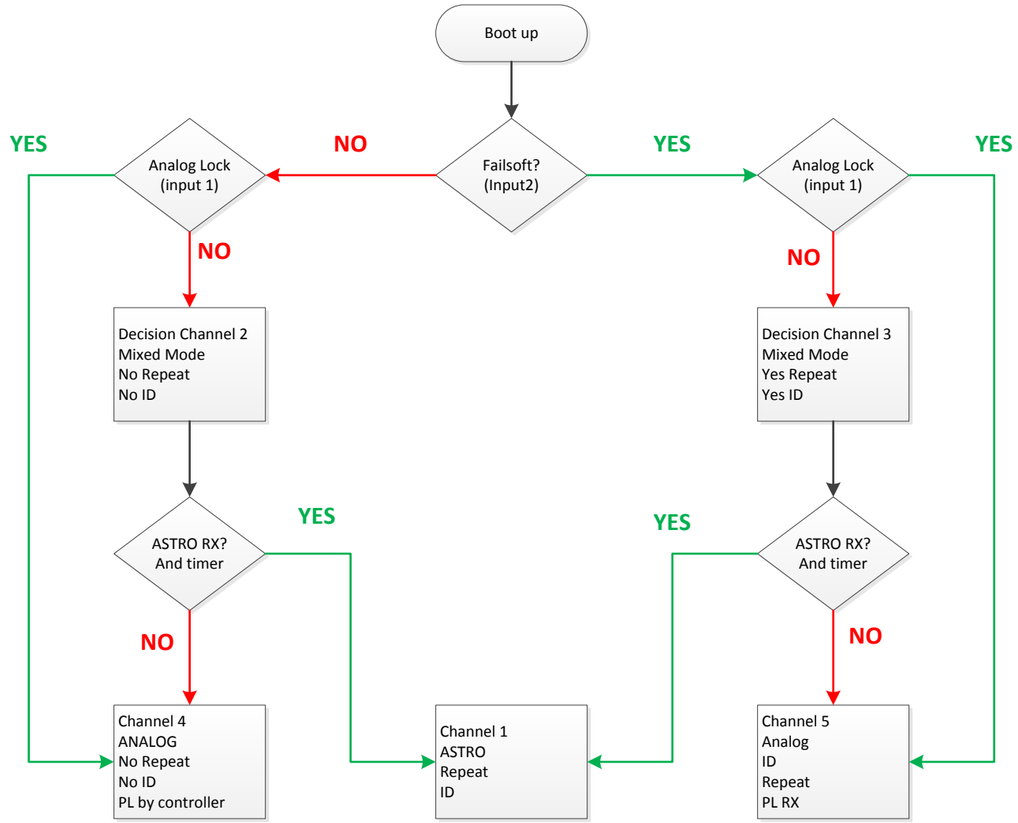


Input Active Low
1 - Analog Lock
2 - Failsoft
3 - UNUSED
4 - CH Reset
9 - PTT Contact close

Outputs Active High
1 - PL Active
2 - DON'T USE (low)
3 - Alarm
7 - RX COR Relay

Timers
1 - Chain Start
2 - Chain
3 - Chain
4 - Chain
5 - Chain Stop
6 -
7 -
8 - COS, not ASTRO
9 - Mode Lock Holdoff
10 - PL Hold off on WL

Event Flags
1 - Chan 1 ASTRO with Controller
2 - Chan 4 Analog with Controller
3 - Chan 5 Analog no Controller
4 - Chan 1 Astro no Controller
5 - Hold Off with Controller Chan 4
6 - Hold Off no Controller Chan 5
7 - Hold Off Chan 1
8 -
9 -
10 -
11 -
12 -
13 -
14 -
15 -
16 -

Red Text in wildcard denotes a customer settable value

Logical Flow and Wildcard Tables				
DRAWN 12-OCT-2017	SIZE	FSCM NO	DWG NO	REV 4
ISSUED	SCALE 1 : 1	Bryan Fields, W9CR	SHEET 1 OF 5	

1 - COS + Audio
RX Carrier Detect

Action	Inaction
Timer 8 - 50ms	Abort Timer 8
	Clr Output 7
	RX Qual Normal

2 - PTT From Wireline
Input 9 and not Cur Channel 1

Action	Inaction
Tx PL enable	Tx PL Disable
Key from WL	Start Timer 10 -5 sec
Abort Timer 10	

3 - PL Active
Rx PL Detect

Action	Inaction
Set Output 1	Clr Output 1

4 - Alarm
Stn Alarm

Action	Inaction
Set Output 3	Clr Output 3

5 - RX P25 NO Fail
RX Astro ID and not Input 2

Action	Inaction
Start Timer 9 - 10s	Start Timer 1 - 65s
Abort Timer 1:5	Abort Timer 9
Set Flag 1	Clear Flag 7
Set Flag 7	

6 - Timer P25 No Fail
Timer 5 done and Event Flag 1

Action	Inaction
Channel 2	Null
Clear Event Flag 1	

7 - Timer 2 > 3
Timer 2 done

Action	Inaction
Timer 3 - 65s	Null

8 - Timer 3 > 4
Timer 3 done

Action	Inaction
Timer 4 - 65s	Null

9 - Timer 4 > 5
Timer 4 done

Action	Inaction
Timer 5 - 65s	Null

10 - RX Analog and No Fail
RX Analog and not Input 1 and not Input 2

Action	Inaction
Start Timer 9 - 10s	Start Timer 1 - 65s
Abort Timer 1:5	Abort Timer 9
Clear Flag 2	Set Flag 2
Set Flag 5	Clear Flag 5

11 - Timer Analog and No Fail
Timer 5 done and Flag 2

Action	Inaction
Chan 2	Null
Clear Flag 2	

12 - Failsoft
Input 2 and not Input 1

Action	Inaction
Chan 3	Chan 2
Rx PL Enable	Null
Alarm Tone - 4	Alarm Tone off - 4

13 - Analog Failsoft
Rptr Qual Met and Input 2 and not Cur Chan 1

Action	Inaction
Start Timer 9 - 10s	Start Timer 1 - 65s
Abort Timer 1:5	Abort Timer 9
Clear Flag 3	Set Flag 3
Set Flag 6	Clear Flag 6

14 - Timer Analog Fail
Timer 5 done and Event Flag 3 and not Inpt 1

Action	Inaction
Channel 3	Null
Clear Event Flag 3	

15 - RX P25 Failsoft
RX Astro ID and Input 2

Action	Inaction
Start Timer 9 - 10s	Start Timer 1 - 65s
Abort Timer 1:5	Abort Timer 9
Set Flag 4	Null
Set Flag 7	Clear Flag 7

16 - Timer P25 Failsoft
Timer 5 done and Event Flag 4

Action	Inaction
Channel 3	Null
Clear Event Flag 4	

17 - Analog Lock with Controller
Input 1 and not Input 2

Action	Inaction
Channel 4	Channel 2
Abort Timer 1:5	
Abort Timer 9	
Clear Flag 1:7	

18 - Analog Lock Failsoft
Input 1 and Input 2

Action	Inaction
Channel 5	Channel 3
Abort Timer 1:5	
Abort Timer 9	
Clear Flag 1:7	
Rx PL Enable	
Alarm Tone - 4	Alarm Tone off - 4

19 - Reset and not Failsoft
Warm or Cold Reset and not Input 2

Action	Inaction
Channel 2	Null
Abort Timer 1:5	
Clear Flag 1:7	

20 - Warm Reset w/controller and Analog Lock
Warm Reset and Input 1 and not Input 2

Action	Inaction
Channel 4	Null
Abort Timer 1:5	
Clear Flag 1:7	

21 - Cold Reset w/controller and Analog Lock
Cold Reset and Input 1 and not Input 2

Action	Inaction
Channel 4	Null
Abort Timer 1:5	
Clear Flag 1:7	

22 - Warm Reset wo/control and Analog Lock
Warm Reset and Input 1 and Input 2

Action	Inaction
Channel 5	Null
Abort Timer 1:5	
Clear Flag 1:7	
Rx PL Enable	
Alarm Tone - 4	Alarm Tone off - 4

23 - Cold Reset wo/control and Analog Lock
Cold Reset and Input 1 and Input 2

Action	Inaction
Channel 5	Null
Abort Timer 1:5	
Clear Flag 1:7	
Rx PL Enable	
Alarm Tone - 4	Alarm Tone off - 4

24 - PL Hang Timer
Timer 10 Done

Action	Inaction
Dekey from WL	Null
PL Enable	

25 - Analog Ch4 Hold off Timer
Timer 9 done and flag 5 and not Input 1

Action	Inaction
Chan 4	Null
Clear Flag 5	

26 - Analog Ch5 Hold off Timer
Timer 9 done and flag 6 and not Input 1

Action	Inaction
Chan 5	Null
Clear Flag 6	

27 - P25 Lock Hold off Timer
Timer 9 done and Flag 7 and not Input 1

Action	Inaction
Chan 1	Null
Clear Flag 7	

28 - COR P25 Hold off
Timer 8 done and not RX Astro ID and not Chan 1

Action	Inaction
Output 7	Null
RX Qual Force	

29 - Chan 2 from controller
Input 4

Action	Inaction
Chan 2	Null

30 - Timer 1 > 2
Timer 1 done

Action	Inaction
Timer 2 - 65s	Null

Boot up

YES

Analog Lock (input 1)

YES

Failsoft? (Input2)

YES

NO

Analog Lock (input 1)

YES

NO

21 – Cold Reset w/controller and Analog Lock
Cold Reset and Input 1 and not Input 2

Action	Inaction
Channel 4	Null
Abort Timer 1:5	
Clear Flag 1:7	

20 – Warm Reset w/controller and Analog Lock
Warm Reset and Input 1 and not Input 2

Action	Inaction
Channel 4	Null
Abort Timer 1:5	
Clear Flag 1:7	

23 – Cold Reset wo/control and Analog Lock
Cold Reset and Input 1 and Input 2

Action	Inaction
Channel 5	Null
Abort Timer 1:5	
Clear Flag 1:7	
Rx PL Enable	
Alarm Tone – 4	Alarm Tone off – 4

22 – Warm Reset wo/control and Analog Lock
Warm Reset and Input 1 and Input 2

Action	Inaction
Channel 5	Null
Abort Timer 1:5	
Clear Flag 1:7	
Rx PL Enable	
Alarm Tone – 4	Alarm Tone off – 4

19 – Reset and not Failsoft
Warm or Cold Reset and not Input 2

Action	Inaction
Channel 2	Null
Abort Timer 1:5	
Clear Flag 1:7	

Decision Channel 2
Mixed Mode
No Repeat
No ID

12 – Failsoft
Input 2 and not Input 1

Action	Inaction
Chan 3	Chan 2
Rx PL Enable	Null
Alarm Tone – 4	Alarm Tone off – 4

18 – Analog Lock Failsoft
Input 1 and Input 2

Action	Inaction
Channel 5	Channel 3
Abort Timer 1:5	
Abort Timer 9	
Clear Flag 1:7	
Rx PL Enable	
Alarm Tone – 4	Alarm Tone off – 4

17 – Analog Lock with Controller
Input 1 and not Input 2

Action	Inaction
Channel 4	Channel 2
Abort Timer 1:5	
Abort Timer 9	
Clear Flag 1:7	

Channel 5
Analog
ID
Repeat
PL RX

Channel 4
ANALOG
No Repeat
No ID
PL by controller

15 – RX P25 Failsoft
RX Astro ID and Input 2

Action	Inaction
Start Timer 9 – 10s	Start Timer 1 – 65s
Abort Timer 1:5	Abort Timer 9
Set Flag 4	Null
Set Flag 7	Clear Flag 7

16 – Timer P25 Failsoft
Timer 5 done and Event Flag 4

Action	Inaction
Channel 3	Null
Clear Event Flag 4	

Decision Channel 3
Mixed Mode
Yes Repeat
Yes ID

5 – RX P25 NO Fail
RX Astro ID and not Input 2

Action	Inaction
Start Timer 9 – 10s	Start Timer 1 – 65s
Abort Timer 1:5	Abort Timer 9
Set Flag 1	Clear Flag 7
Set Flag 7	

27 – P25 Lock Hold off Timer
Timer 9 done and Flag 7 and not Input 1

Action	Inaction
Chan 1	Null
Clear Flag 7	

Channel 1
ASTRO
Repeat
ID

6 – Timer P25 No Fail
Timer 5 done and Event Flag 1

Action	Inaction
Channel 2	Null
Clear Event Flag 1	

26 – Analog Ch5 Hold off Timer
Timer 9 done and flag 6 and not Input 1

Action	Inaction
Chan 5	Null
Clear Flag 6	

29 – Chan 2 from controller
Input 4

Action	Inaction
Chan 2	Null

13 – Analog Failsoft
Rptr Qual Met and Input 2 and not Cur Chan 1

Action	Inaction
Start Timer 9 – 10s	Start Timer 1 – 65s
Abort Timer 1:5	Abort Timer 9
Clear Flag 3	Set Flag 3
Set Flag 6	Clear Flag 6

14 – Timer Analog Fail
Timer 5 done and Event Flag 3 and not Inpt 1

Action	Inaction
Channel 3	Null
Clear Event Flag 3	

10 – RX Analog and No Fail
RX Analog and not Input 1 and not Input 2

Action	Inaction
Start Timer 9 – 10s	Start Timer 1 – 65s
Abort Timer 1:5	Abort Timer 9
Clear Flag 2	Set Flag 2
Set Flag 5	Clear Flag 5

11 – Timer Analog and No Fail
Timer 5 done and Flag 2

Action	Inaction
Chan 2	Null
Clear Flag 2	

25 – Analog Ch4 Hold off Timer
Timer 9 done and flag 5 and not Input 1

Action	Inaction
Chan 4	Null
Clear Flag 5	

Logical Routing				
DRAWN 12-Oct-2017	SIZE	FSCM NO	DWG NO	REV 3
ISSUED	SCALE 1 : 1	Bryan Fields, W9CR	SHEET 2 OF 5	

30 – Timer 1 > 2
Timer 1 done

Action	Inaction
Timer 2 – 65s	Null

7 – Timer 2 > 3
Timer 2 done

Action	Inaction
Timer 3 – 65s	Null

8 – Timer 3 > 4
Timer 3 done

Action	Inaction
Timer 4 – 65s	Null

9 – Timer 4 > 5
Timer 4 done

Action	Inaction
Timer 5 – 65s	Null

Timer Chain

3 – PL Active
Rx PL Detect

Action	Inaction
Set Output 1	Clr Output 1

4 – Alarm
Stn Alarm

Action	Inaction
Set Output 3	Clr Output 3

2 – PTT From Wireline
Input 9 and not Cur Channel 1

Action	Inaction
Tx PL enable Key from WL Abort Timer 10	Tx PL Disable Start Timer 10 -5 sec

24 – PL Hang Timer
Timer 10 Done

Action	Inaction
Dekey from WL PL Enable	Null

1 – COS + Audio
RX Carrier Detect

Action	Inaction
Timer 8 – 50ms	Abort Timer 8 Clr Output 7 RX Qual Normal

28 – COR P25 Hold off
Timer 8 done and not RX Astro ID and not Chan 1

Action	Inaction
Output 7 RX Qual Force	Null

Stand Alone Logic					
	SIZE	FSCM NO	DWG NO		REV
DRAWN 12-Oct-2017					3
ISSUED	SCALE 1 : 1		Bryan Fields, W9CR	SHEET 3 OF 5	

26	Pair 1	26	Line 1 -
1		1	Line 1 +
27	Pair 2	27	Line 2 -
2		2	Line 2 +
28	Pair 3	28	Line 3 -
3		3	Line 3 +
29	Pair 4	29	Line 4 -
4		4	Line 4+
30	Pair 5	30	Modem -
5		5	Modem +
31	Pair 6	31	DMR -
6		6	DMR +
32	Pair 7	32	Ground
7		7	Ground
33	Pair 8	33	14.4V Out
8		8	5V out
34	Pair 9	34	Gen Tx Data -
9		9	Gen Tx Data +
35	Pair 10	35	PL - In
10		10	PL + In
36	Pair 11	36	Aux Out 1
11		11	Aux In 1
37	Pair 12	37	Aux Out 2
12		12	Aux In 2
38	Pair 13	38	Aux Out 3
13		13	Aux In 3
39	Pair 14	39	Aux Out 4
14		14	Aux In 4
40	Pair 15	40	Aux Out 5
15		15	Aux In 5
41	Pair 16	41	Aux Out 6
16		16	Aux In 6
42	Pair 17	42	Aux In 8
17		17	Aux In 7
43	Pair 18	43	Aux Out 7
18		18	Aux Out 7
44	Pair 19	44	Aux Out 8
19		19	Aux Out 8
45	Pair 20	45	Aux Out 9
20		20	Aux Out 9
46	Pair 21	46	Aux Out 10
21		21	Aux Out 10
47	Pair 22	47	Aux In 9
22		22	Aux In 9
48	Pair 23	48	Aux In 10
23		23	Aux In 10
49	Pair 24	49	Aux In 11
24		24	Aux In 11
50	Pair 25	50	Aux In 12
25		25	Aux In 12

ARS Audio Delay Module

1 – 12v
2 – Input
3 – High
4 – N.C.
5 – Out
6 – Ground

Glue Board

1 – + 5V
2 – AO 1
3 – AO 3
4 – AO 7 – Bias
5 – AI9 - Bias
6 – AI9 – PTT
7 – Local Ctrl
8 – AI1 – ALGLCK
9 – AI2 - FAILSFT
10 – AI3
11 – AI4
12 – Ground
13 – Ground
14 – Ground
15 – Ground
16 – PTT RA35

1k

1 – 5V
2 – Ground
3 – Line 1
4 – Line 2
5 – Line 3
6 – Line 4

Level Shifter

12 – 3V
11 Ground
10 – Line 1
9 – Line 2
8 – Line 3
7 – Line 4

36
1k
3v Relay

PTT
Analog Lock

Key Station from WL
Disable PTT from WL
Normal Operation

Analog Lock
N/A
Normal Operation

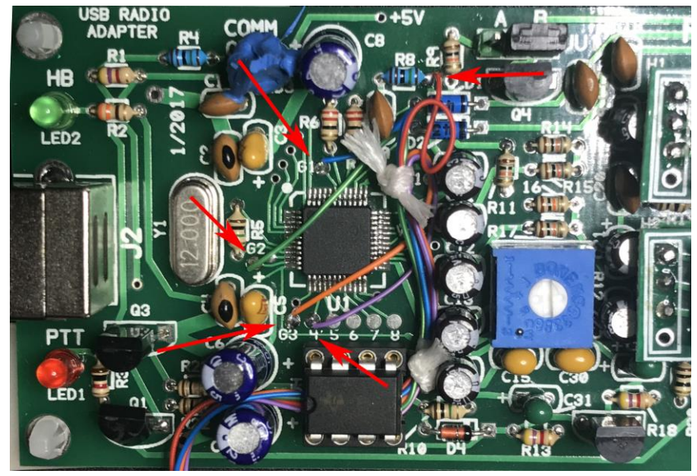
RA-35

1 – AUX
2 – Audio Out
3 – COS
4 – PL
5 – PTT
6 – Audio In
7 – Local Ctrl
8 – Ground
9 – External V+

GPIO 1
GPIO 2
GPIO 3
GPIO 4
Ground
+3.3 V

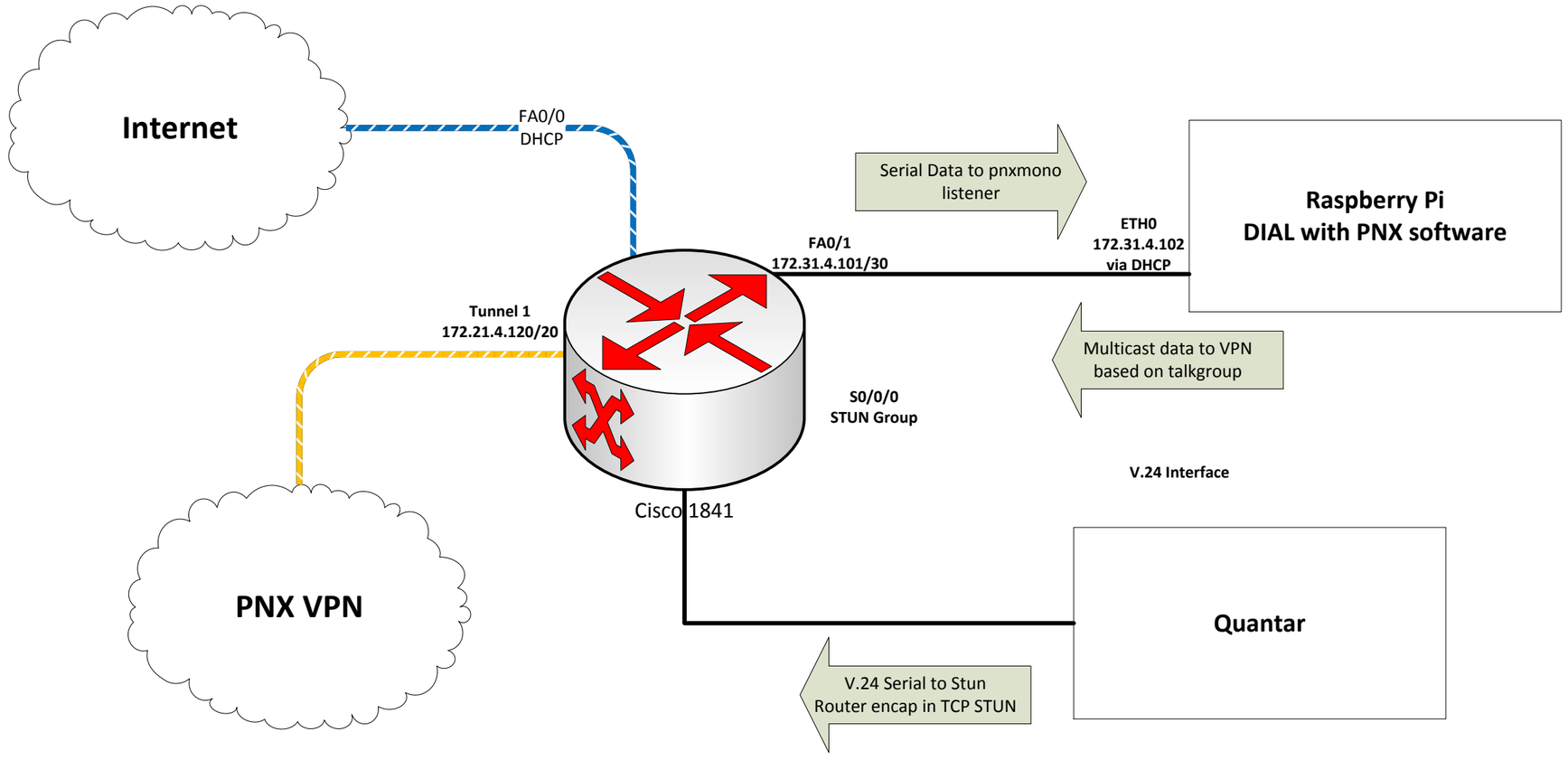
Raspberry Pi and 12v supply

1 – 12v in
2 – Ground



RA-35 GPIO and 3v hookup locations

Quantar Interconnect and 66 Block					
DRAWN	12-Oct-2017	SIZE	FSCM NO	DWG NO	REV 2
ISSUED		SCALE 1 : 1	Bryan Fields, W9CR	SHEET 4 OF 5	



There are a couple NAT rules on the router
1. Pass the UDP asterisk port to the inside private IP port 4569
2. Allow port 222 TCP to the PI inside IP for SSH
3. overload NAT allowing external access

You should setup a VTY ACL allowing the following
172.16.0.0/21
44.98.249.177/32
Any other IP's you need. Note with the forward, all the internet will be able to get to the public SSH port which is forwarded to the PI. You may want a firewall on the PI.

Setup a login and password, and disable telnet.

Note all this is predicated on the idea the FA0/0 interface has a public IP address. If it doesn't, you have a NAT 444 setup and will need to forward ports from the gateway router. This is beyond the scope of this document.

P25nx and DIAL network				
	SIZE	FSCM NO	DWG NO	REV
DRAWN 7-Oct-2017				1
ISSUED	SCALE 1 : 1	Bryan Fields, W9CR	SHEET 5 OF 5	