

ALERT2 IMPLEMENTATION REPORT

Dan Hurley
Engineering Systems Specialist
City of Overland Park, KS

Step 1 - Test Phase

- ⦿ Napkin Design at 2007 NHWC
- ⦿ ALERT and Alert2 concentration running in parallel to Linux PC which collected raw Alert2 data
- ⦿ Additional antenna required at each repeater site and at base station

Step 2 - Alert2 Concentration

- ③ 3 repeaters (3 input frequencies, 1 output)
- ③ ALERT decoders provide serial output of data to Alert2 Concentrators which re-broadcast the data
 - (Hint: turn off ALERT re-transmits)
- ③ Additional antenna required at each repeater site
- ③ Base station requires Alert2 decoder and means to transport decoded data to server (IP or RS485)

Plans



Image U.S. Geological Survey
Image © 2010 Sanborn

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Imagery Date: Mar 12, 2007

39°06'41.44" N 94°49'53.52" W elev 0 ft

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Eye alt 18.87 mi

Step 3 - Alert2 Repeaters

- Reduced input frequency to two
- Installed A2 repeaters with two radios (one input frequency, one output)
- ALERT decoder continues to listen on input frequency as well as A2 repeater (splitter on input frequency coax)

Step 4 - TDMA Plan

- ① Determine Frame Length and Slot-size needs
- ① Assign Source Addresses
- ① Assign slots (OP A2 TDMA 1013.xlsx)
- ① Migrate ALERT sites to Alert2
- ① Turn off ALERT decoders

Plans



Image U.S. Geological Survey
Image © 2010 Sanborn

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Eye alt 18.87 mi

Alert2 Experiences/Impressions

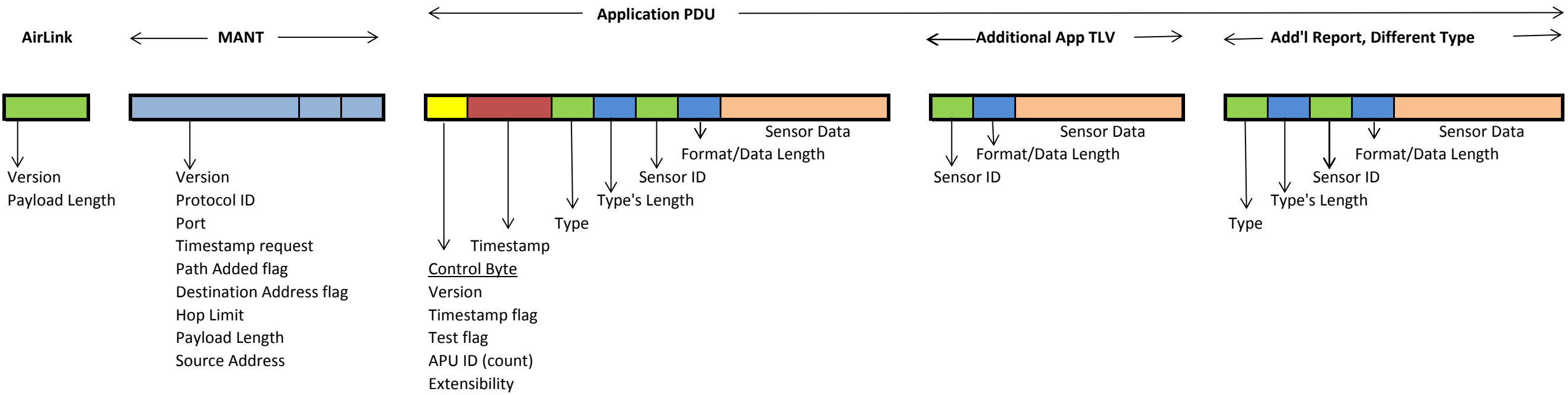
- ◎ Still mixed with ALERT
 - Performance gains TBD
- ◎ More complicated installation & maintenance at first, but easier with experience
- ◎ A2 Field Decoder- different role
- ◎ Analog PT's more finely tuned
 - More flexibility with slopes/offsets

Alert2 Experiences/Impressions

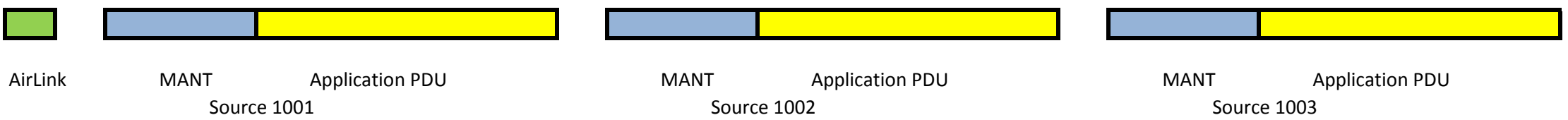
- ⦿ Engineering Units
 - Slopes/offsets at transmitter
- ⦿ Migrating to digital water level sensors
- ⦿ Test Transmissions not immediate
- ⦿ Pay attention to radio signal modulation

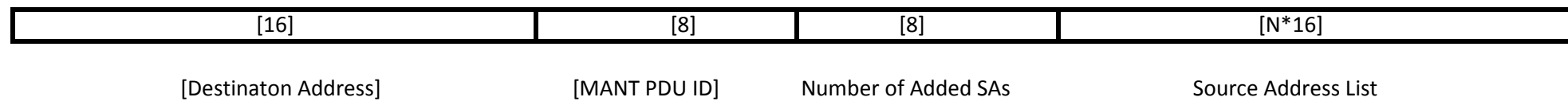
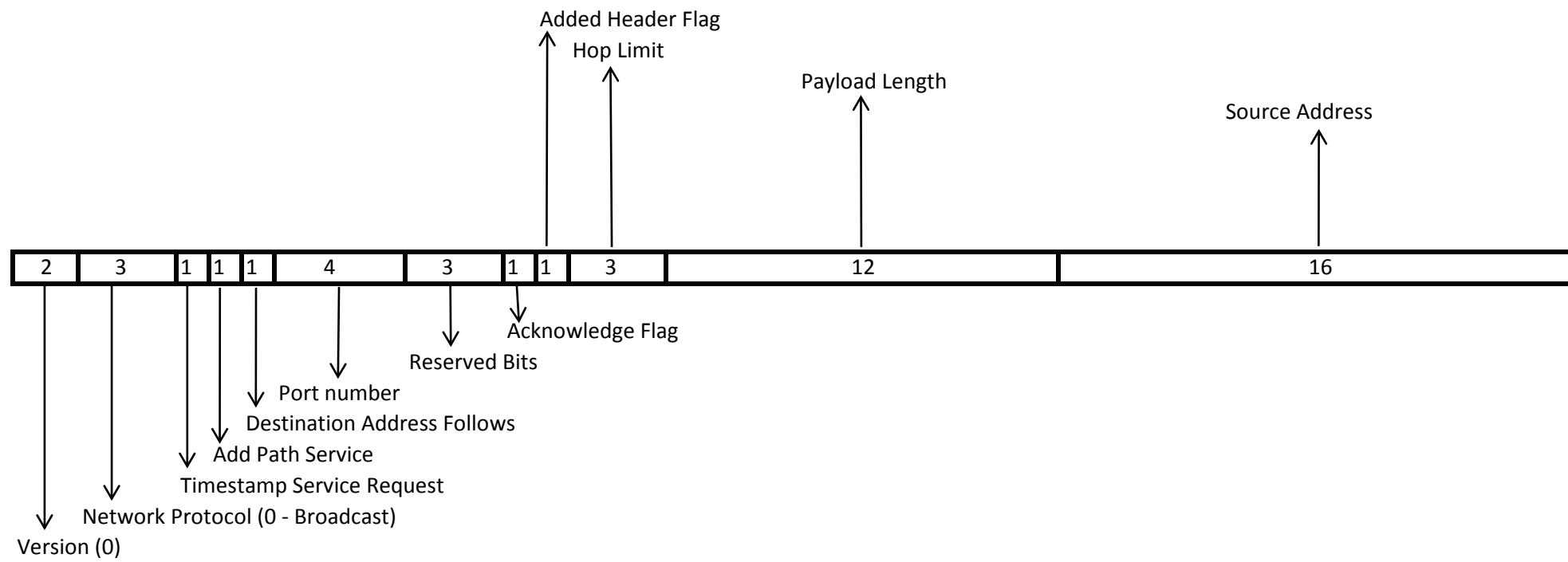
Questions?

Gage Site Message



Repeated Message





ALERT2 Decoder Output

B2010 (& R2011); Software Revisions greater than # 92, up to XX

R. Chris Roark

ALERT2 MANT Spec Ver. 1.1**IND API Spec Ver. 0.5 Section 5.2 - ASCII MANT Output**

<i>Field</i>	<i>Field #</i>	<i>Optional or Required</i>	<i>Typical Output</i>	<i>Definition</i>	<i>Notes</i>
N	0	R	N	MANT start character	
Timetag	1	R	2012	year	Linux system time at the receipt of "x" character from the DSP demodulator (approx. 10 - 35 millisecc from the start of Bit Sync data transmission.)
	1	R	11	month	
	1	R	8	day	
	1	R	17	hour	
	1	R	59	minute	
	1	R	35.16	seconds	
MANT version	2	R	0	MANT Spec Version	0 = MANT ALERT2 Spec 1.0
Protocol ID	3	R	0	Network Protocol Rqst	0 = Best Efforts
Time Stamp Rqst	4	R	0	request to IND to embed its ts into App Layer PDU	When set, if the IND has a valid GMT time, two bytes, representing a 16 bit time stamp, in seconds since GMT midnight or noon, is inserted into immediately after the PDU's Control byte; also it sets TS Control bit in the Control byte and clears the "Time Stamp Rqst" in the MANT hdr.
Add Path Rqst	5	R	1	add SA path traversed by MANT packet to MANT hdr.	When set the count and list of SA is appended; there MUST be an SA count appended to the MANT hdr. (possibly with value 0).
Add DA Rqst	6	R	0	add Destination SA address to MANT hdr.	When set the optional DA field is appended to MANT hdr.
Protocol Port	7	R	1	MANT Protocol Port Number	0 = ALERT2 Application Layer Self Reporting Protocol; 1= ALERT2 Application Layer Concentration Protocol; 0x80 = IND Configuration & Control port
Reserved	8	R	0	MANT header reserved bits	
ACK bit	9	R	0	EERDS ACK bit	(reserved for future EERDS use.)
Added Hdr. bit	10	R	0	An additional MANT header is appended	
Hop Limit	11	R	1	Hops left	A MANT packet received with Hop Limit = 0 is not retransmitted.
Payload Length	12	R	27	Length of the PDU	
SA	13	R	34354	Originating IND Source Address	Source Address of the original transmitter of this MANTpacket.
DA		O		Destination SA	ONLY, and REQUIRED, if "Add DA Rqst" is set
MANT PDU ID		O		MANT ID number	ONLY for some Network Protocol ID types (but not required for Best Efforts); EERDS requires this field.
Number of SAs		O	0	Number of SAs appended	ONLY, and REQUIRED, when "Add Path Rqst" is set.
SA 1		O		SA of 1st IND to pass packet	Originating IND is NOT the first to pass, it is the Originating IND SA (field 18)
SA 2		O		SA of 2nd IND to pass packet	
...		O		... continued appended SAs	
SA N		O		SA of Nth IND to pass packet	N MUST equal "Number of SAs"
PDU		R (O)	54, 53,...	Payload Data Unit	for Port Number = 0 & 1 this is the ALERT2 Application PDU; (Note for some Port Numbers or Protocol IDs a PDU may not be required.)

Interpretation of Decoder "N" Message Output

	Year	Mon	Day	Hr	Min	Sec	Mant Ver 1.0	Protocol ID	Timestamp Request	Add Path	Add Destination	Port	Reserved	ACK	Added Header	Hop Limit	Payload Length	Source Address	[Destination Address]	[MANT PDU ID]	Num of Added Sas	[Added SA]	
N,	2013,	03,	05,	17,	42,	39.65,	0,	0,	1,	1,	1,	0,	0,	0,	0,	1,	37,	1160,				6502,	Application Protocol Data Unit (Hex)
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18					

General Sensor Report

Control C	(TS)	Type (1) T	Len L	Sensor Data					
				Sensor S	FL	Value V	Sensor S	FL	Value V

Tipping Bucket Rain Report

Control C	(TS)	Type (2) T	Len L	TB Data					
				Sensor S	FL	Accum	TO	TO	TO

Multi-Sensor Report

Control C	(TS)	Type (3) T	Len L	Compact Multi-Sensor Report								
				Data Flags	Air Temp	RH	Baro	WS	WD	Peak Wind	Stage	Battery

ALERT Concentration

Control C	(TS)	Concentrator ALERT					
		ALERT (1)	TO (1)	ALERT (2)	TO (2)	ALERT (n)	TO (n)

Packet Content	Packet Length	AirLink	MANT	Cntrl, TS	App Type App Len	Rain S/FL Accum(2)	Bytes per Tip	Multi-Sensor OH	MSR Sens	GSR OH	GSR Sens	Conc Rpts
		2	6	3	2	2	1	1	1,2	2	4	4
Rain, 1 Tip	16	2	6	3	2	2	1					
Rain, 4 Tips	19	2	6	3	2	2	4					
Gen Sensor Rpt w/ 1 4-byte sensor	19	2	6	3	2					2	4	
Gen Sensor Rpt w/ 2 4-byte sensors	25	2	6	3	2					4	8	
Gen Sensor Rpt w/ 5 4-Byte sensors	43	2	6	3	2					10	20	
Concentrator, 1 ALERT	15	2	6	3	0							4
Concentrator, 3 ALERT	23	2	6	3	0							12
Typical Multi-Sensor (2 Sensors)	17	2	6	3	2			1	3			
Typical MSR Wx Stn (5 sensors)	22	2	6	3	2			1	8			
Full Wx Stn MSR (7 sensors)	24	2	6	3	2			1	10			

ALERT2 Message Time Calculator		
Data Bytes (MANT + Application)		85
Configuration Data		
Carrier Only Time		10 msec
AGC Time		25 msec
Minimum slot buffer		25 msec
Preamble Time		51.67
First Block Time		136.67
Bytes in Follow on blocks	63	
Full Follow on blocks	1	
Bytes in Partial Block	31	
Full Follow on Block Time		160.00
Partial Block Time		160.00
Total Required Slot Time		533.33 msec

Blue Water Design/Telos Services Feb. 2013

ALERT2 Message Format V 1.1

First Block (including AirLink Hc	24	bytes
Follow on Block	32	bytes
Bit Rate	4800	bps
Correlation	10	bytes
Tail	2	bytes

How Application PDUs Are Built Matters

Packet Content	No of App Msgs	Packet Length	AirLink	MANT	Cntrl, TS	App Type App Len	Multi-Sensor OH	MSR Sens	GSR OH	GSR Sens	Msg Time
Typical Multi-Sensor Report (RH, AT, WS, WD, BV)	1	22	2	6	3	2	1	8			213 ms
General Sensor Report Five 2-byte values	1	33	2	6	3	2			10	10	307 ms
General Sensor Report Five 4-byte values	1	43	2	6	3	2			10	20	340 ms
2-byte values sent individually to IND	5	77	2	6	3	2			2	2	507 ms
4-byte values sent individually to IND	5	87	2	6	3	2			2	4	593 ms

Slot Capacity in Messages and Bytes

Repeated Message Size, bytes (= MANT + App)	25
Buffer length, msec	25
Carrier Only, msec	10
AGC, msec	25
Total Preamble Time	51.67
Messages in 1st Block	0.88
Messages in 2nd Block	1.28

Slot, msec	FO block time	Full FO Blocks	Usable Last Block Time	Msgs in Last Blk	Total Msgs	Total Bytes
500	286.66	1	70.0	0.84	3.00	75
1000	786.66	4	90.0	1.08	7.08	177
1500	1286.66	8	0.0	0.00	11.12	278
2000	1786.66	11	0.0	0.00	14.96	374
2500	2286.66	14	0.0	0.00	18.80	470
3000	2786.66	17	10.0	0.12	22.76	569
3500	3286.66	20	30.0	0.36	26.84	671
4000	3786.66	23	50.0	0.60	30.92	773
4500	4286.66	26	70.0	0.84	35.00	875
5000	4786.66	29	90.0	1.08	39.08	977

Sites which may require 1 sec slots

	Site ID	Name	Sensors
Direct	1600	Roe at Tomahawk Creek	11
	2300	Kenneth @ Blue River	11
	3460	Johnson County Transit Building	10
Direct	1700	J.C.C.C.	10
Direct	1730	I-435 & Nall	9
(Direct)?	2420	85th St. @ Blue River	9
	2010	151st & England	9
Direct	5020	75th @ Brush Creek	9
	2030	199th & Padbury	9
	3880	Prairie View Weather	9
	3420	159th & Edgerton	8

Slot Requirement for Johnson County Transit Building

<u>Multi-Sensor Report</u>	<u>4- byte GSR</u>	<u>Precip w 4 tips</u>		
3462 Air temperature	3466 Soil temperature	3460 Precipitation accumulation		
3461 Relative humidity	3463 Net solar radiation			
3464 Barometric pressure	3465 Soil moisture			
3459 Wind velocity				
3458 Wind Direction				
3467 Wind velocity, maximum				
23	31	21 ----->	75 ----->	500 msec

	3462 Air temperature	3460 Precipitation accumulation		
	3461 Relative humidity			
	3464 Barometric pressure			
	3459 Wind velocity			
	3458 Wind Direction			
	3467 Wind velocity, maximum			
	3466 Soil temperature			
	3463 Net solar radiation			
	3465 Soil moisture			
	67	20 ----->	87 ----->	593 msec

Slot Requirement for 159th

<u>Multi-Sensor Report</u>
3422 Air temperature
3421 Relative humidity
3424 Barometric pressure
3419 Wind velocity
3418 Wind Direction
3427 Wind velocity, maximum
3425 Battery voltage
24

0

1 and Edgerton

4- byte GSR

Precip w 3 tips

3420 Precipitation accumulation

0	21	45
---	----	----

347 msec

- 3422 Air temperature
- 3421 Relative humidity
- 3424 Barometric pressure
- 3419 Wind velocity
- 3418 Wind Direction
- 3427 Wind velocity, maximum
- 3425 Battery voltage
- 3420 Precipitation accumulation

55	21	76
----	----	----

503 msec

Overland Park Repeater Loading and Slot Time Requirements

Assumptions:

120 sec gage frame distributed across 4-30 sec repeater frames

10% of gages are 1 sec slots

Every gage reports in a frame in worst case

Every repeater repeats 2/3 of system - no pass listing

Gages to be repeated	80	120	180	240
Reports received per repeater per frame	13	20	30	40
Long reports	2	2	3	4
Regular reports	11	18	27	36
Bytes per Repeater Tx	457	624	936	1248
Required Repeater Slot Time, sec	2.5	3.5	5.0	7.0
Direct slots available, 60 sec frame	45	39	30	18

Direct slots can be increased 2x by using 120 sec direct gage frame

Repeater	Slot	Offset	Source Address	Site #	Site Name	Repeater	Slot	Offset	Source Address	Site #	Site Name
	0	0					60	60000			
	1	500	16006	1100	O.P. City Hall		61	60500	16006	1100	O.P. City Hall
	2	1000					62	61000			
	3	1500	16008	1150	Mission Rd. @ Indian Creek		63	61500	16008	1150	Mission Rd. @ Indian Creek
	4	2000					64	62000			
	5	2500	16009	1160	Proposed Roe @ Indian Cr		65	62500	16009	1160	Proposed Roe @ Indian Cr
	6	3000					66	63000			
	7	3500	16010	1170	Proposed 97th @ Indian Trib		67	63500	16010	1170	Proposed 97th @ Indian Trib
	8	4000	16011	1180	Proposed Lamar @ Indian Cr		68	64000	16011	1180	Proposed Lamar @ Indian Cr
	9	4500				69	64500				
Johnson County Repeater 5 Sec 1010	10	5000				Johnson County Repeater 5 Sec 1010	70	65000			
	11	5500					71	65500			
	12	6000					72	66000			
	13	6500					73	66500			
	14	7000					74	67000			
	15	7500					75	67500			
	16	8000					76	68000			
	17	8500					77	68500			
	18	9000					78	69000			
	19	9500				79	69500				
Century Towers Repeater 5 Sec	20	10000					80	70000			
	21	10500	16012	1190	Proposed 87th & Lamar		81	70500	16012	1190	Proposed 87th & Lamar
	22	11000					82	71000			
	23	11500	16013	1200	U.S.G.S.		83	71500	16013	1200	U.S.G.S.
	24	12000					84	72000			
	25	12500	16015	1300	Corporate Woods		85	72500	16015	1300	Corporate Woods
	26	13000					86	73000			
	27	13500	16016	1400	Waterford Place		87	73500	16016	1400	Waterford Place
	28	14000	16017	1450	I-435 @ Quivira		88	74000	16017	1450	I-435 @ Quivira
	29	14500				89	74500				
Blue Valley Repeater 5 Sec 1011	30	15000				Blue Valley Repeater 5 Sec 1011	90	75000			
	31	15500					91	75500			
	32	16000					92	76000			
	33	16500					93	76500			
	34	17000					94	77000			
	35	17500					95	77500			
	36	18000					96	78000			
	37	18500					97	78500			
	38	19000					98	79000			
	39	19500				99	79500				
	40	20000					100	80000			
	41	20500	16019	1600	Roe @ Tomahawk Creek		101	80500	16019	1600	Roe @ Tomahawk Creek
	42	21000					102	81000			
	43	21500	16020	1610	Metcalfe @ Tomahawk Creek		103	81500	16020	1610	Metcalfe @ Tomahawk Creek
	44	22000					104	82000			
	45	22500	16027	1680	Wilshire Woods		105	82500	16027	1680	Wilshire Woods
	46	23000	16028	1700	J.C.C.C.		106	83000	16028	1700	J.C.C.C.
	47	23500					107	83500			
	48	24000	16029	1730	I-435 & Nall		108	84000	16029	1730	I-435 & Nall
	49	24500				109	84500				
Century Towers Repeater 5 Sec 1012	50	25000				Century Towers Repeater 5 Sec 1012	110	85000			
	51	25500					111	85500			
	52	26000					112	86000			
	53	26500					113	86500			
	54	27000					114	87000			
	55	27500					115	87500			
	56	28000					116	88000			
	57	28500					117	88500			
	58	29000					118	89000			
	59	29500				119	89500				
	60	30000					60	90000			
	61	30500	16050	2980	Metcalfe @ Turkey Creek		61	90500	16050	2980	Metcalfe @ Turkey Creek
	62	31000					62	91000			
	63	31500	16051	2990	Lamar @ Turkey Creek		63	91500	16051	2990	Lamar @ Turkey Creek
	64	32000					64	92000			
	65	32500	16052	3010	Johnson Dr @ Turkey Creek		65	92500	16052	3010	Johnson Dr @ Turkey Creek
	66	33000	16053	3020	69th @ Quail Crk Trib to Turkey	66	93000	16053	3020	69th @ Quail Crk Trib to Turkey	

	67	33500					67	93500			
	68	34000	16054	3090	Antioch Rd On-Ramp @ Turkey Creek		68	94000	16054	3090	Antioch Rd On-Ramp @ Turkey Creek
	69	34500					69	94500			
Johnson County Repeater 5 Sec 1010	70	35000				Johnson County Repeater 5 Sec 1010	70	95000			
	71	35500					71	95500			
	72	36000					72	96000			
	73	36500					73	96500			
	74	37000					74	97000			
	75	37500					75	97500			
	76	38000					76	98000			
	77	38500					77	98500			
	78	39000				78	99000				
	79	39500				79	99500				
	80	40000				80	100000				
	81	40500	16059	3130	Lackman @ Little Mill Creek		81	100500	16059	3130	Lackman @ Little Mill Creek
	82	41000				82	101000				
	83	41500	16062	3160	79th St @ Little Mill Creek		83	101500	16062	3160	79th St @ Little Mill Creek
	84	42000	16064	3180	67th & Caenen		84	102000	16064	3180	67th & Caenen
	85	42500	16089	4900	Belinder @ Brush Creek Master		85	102500	16089	4900	Belinder @ Brush Creek Master
	86	43000				86	103000				
	87	43500	16090	4910	Fairway Master		87	103500	16090	4910	Fairway Master
	88	44000				88	104000				
	89	44500				89	104500				
Blue Valley Repeater 5 Sec 1011	90	45000				Blue Valley Repeater 5 Sec 1011	90	105000			
	91	45500					91	105500			
	92	46000					92	106000			
	93	46500					93	106500			
	94	47000					94	107000			
	95	47500					95	107500			
	96	48000					96	108000			
	97	48500					97	108500			
	98	49000				98	109000				
	99	49500				99	109500				
	100	50000				100	110000				
	101	50500	16091	4920	66th & Indian Lane Master		101	110500	16091	4920	66th & Indian Lane Master
	102	51000				102	111000				
	103	51500	16092	5010	Mission @ Rock Creek		103	111500	16092	5010	Mission @ Rock Creek
	104	52000	16093	5020	75th @ Brush Creek		104	112000	16093	5020	75th @ Brush Creek
	105	52500				105	112500				
	106	53000	16094	5030	74th @ Brush Creek		106	113000	16094	5030	74th @ Brush Creek
	107	53500				107	113500				
	108	54000	16095	5050	Lee Blvd @ Dykes Branch		108	114000	16095	5050	Lee Blvd @ Dykes Branch
	109	54500				109	114500				
Century Towers Repeater 5 Sec 1012	110	55000				Century Towers Repeater 5 Sec 1012	110	115000			
	111	55500					111	115500			
	112	56000					112	116000			
	113	56500					113	116500			
	114	57000					114	117000			
	115	57500					115	117500			
	116	58000					116	118000			
	117	58500					117	118500			
	118	59000				118	119000				
	119	59500				119	119500				

Repeater	Slot	Offset	Source Address	Site#	Site Name	Repeater	Slot	Offset	Source Address	Site #	Site Name	
	0	0	16007	1140	143rd @ Indian Creek		120	60000	16007	1140	143rd @ Indian Creek	
	1	500					121	60500				
	2	1000	16014	1210	Proposed Pflumm @ Indian Cr		122	61000	16014	1210	Proposed Pflumm @ Indian Cr	
	3	1500					123	61500				
	4	2000	16018	1500	Olathe		124	62000	16018	1500	Olathe	
	5	2500					125	62500				
	6	3000	16021	1620	Quivira @ Tomahawk Creek		126	63000	16021	1620	Quivira @ Tomahawk Creek	
	7	3500					127	63500				
	8	4000	16022	1630	Switzer @ Tomahawk Creek		128	64000	16022	1630	Switzer @ Tomahawk Creek	
Johnson County Repeater 5 Sec	9	4500				129	64500					
	10	5000	16023	1640	Morse	130	65000	16023	1640	Morse		
	11	5500				131	65500					
	12	6000	160224	1650	Pflumm @ Tomahawk Creek	132	66000	160224	1650	Pflumm @ Tomahawk Creek		
	13	6500				133	66500					
	14	7000	16025	1660	135th & Pflumm	134	67000	16025	1660	135th & Pflumm		
	15	7500				135	67500					
	16	8000	16026	1670	143rd & Grant	136	68000	16026	1670	143rd & Grant		
	17	8500				137	68500					
	18	9000	16030	2010	151st & England	138	69000	16030	2010	151st & England		
	19	9500				139	69500					
	20	10000	16031	2030	199th & Padbury	140	70000	16031	2030	199th & Padbury		
	21	10500				141	70500					
	22	11000	16032	2050	Bonita	142	71000	16032	2050	Bonita		
	23	11500				143	71500					
	24	12000	16033	2060	199th & Ridgeview	144	72000	16033	2060	199th & Ridgeview		
	25	12500				145	72500					
	26	13000	16034	2070	Stilwell	146	73000	16034	2070	Stilwell		
Blue Valley Repeater 5 Sec	27	13500				147	73500					
	28	14000	16035	2080	191st & Mission	148	74000	16035	2080	191st & Mission		
	29	14500				149	74500					
	30	15000	16036	2090	191st @ East Wolf Creek	150	75000	16036	2090	191st @ East Wolf Creek		
	31	15500				151	75500					
	32	16000	16037	2100	Pflumm @ Coffee Creek	152	76000	16037	2100	Pflumm @ Coffee Creek		
	33	16500				153	76500					
	34	17000	16038	2110	Proposed Quivira @ Coffee Cr	154	77000	16038	2110	Proposed Quivira @ Coffee Cr		
	35	17500				155	77500					
	36	18000	16039	2120	Switzer @ Coffee Creek	156	78000	16039	2120	Switzer @ Coffee Creek		
	37	18500				157	78500					
	38	19000	16040	2140	Mission @ East Camp Branch	158	79000	16040	2140	Mission @ East Camp Branch		
	39	19500				159	79500					
	40	20000	16041	2160	175th @ Camp Branch	160	80000	16041	2160	175th @ Camp Branch		
	41	20500				161	80500					
	42	21000	16042	2170	Nall @ Negro Creek	162	81000	16042	2170	Nall @ Negro Creek		
	43	21500				163	81500					
	44	22000	16043	2180	Metcalfe @ Negro Creek	164	82000	16043	2180	Metcalfe @ Negro Creek		
Century Towers Repeater 5 Sec	45	22500				165	82500					
	46	23000	16044	2200	Mission @ Negro Creek	166	83000	16044	2200	Mission @ Negro Creek		
	47	23500				167	83500					
	48	24000	16045	2210	Kenneth @ Negro Creek	168	84000	16045	2210	Kenneth @ Negro Creek		
	49	24500				169	84500					
	50	25000	16046	2220	Lackman @ Wolf Creek	170	85000	16046	2220	Lackman @ Wolf Creek		
	51	25500				171	85500					
	52	26000	16047	2240	179th @ Wolf Creek	172	86000	16047	2240	179th @ Wolf Creek		
	53	26500				173	86500					
	54	27000	16048	2260	U.S. 69 @ Blue River	174	87000	16048	2260	U.S. 69 @ Blue River		
	55	27500				175	87500					
	56	28000	16049	2300	Kenneth @ Blue River	176	88000	16049	2300	Kenneth @ Blue River		
	57	28500				177	88500					
	58	29000	16055	3100	111th @ Mill Creek	178	89000	16055	3100	111th @ Mill Creek		
	59	29500				179	89500					
	60	30000	16056	3105	Proposed Harold @ Mill Cr	180	90000	16056	3105	Proposed Harold @ Mill Cr		
	61	30500				181	90500					
	62	31000	16057	3110	87th Lane @ Mill Creek	182	91000	16057	3110	87th Lane @ Mill Creek		
	63	31500				183	91500					
	64	32000	16058	3120	SM Pkwy @ Mill Creek	184	92000	16058	3120	SM Pkwy @ Mill Creek		
	65	32500				185	92500					
	66	33000	16060	3140	TC Golf @ Little Mill Creek	186	93000	16060	3140	TC Golf @ Little Mill Creek		

	67	33500					187	93500			
	68	34000	16061	3150	Woodland @ Coon Creek		188	94000	16061	3150	Woodland @ Coon Creek
	69	34500					189	94500			
Johnson County Repeater 5 Sec	70	35000	16063	3170	Woodland @ Clear Creek	Johnson County Repeater 5 Sec	190	95000	16063	3170	Woodland @ Clear Creek
	71	35500					191	95500			
	72	36000	16065	3190	Johnson Dr & K-7		192	96000	16065	3190	Johnson Dr & K-7
	73	36500					193	96500			
	74	37000	16066	3200	K-10 & K-7		194	97000	16066	3200	K-10 & K-7
	75	37500					195	97500			
	76	38000	16067	3210	Old Hwy 56 & Harrison		196	98000	16067	3210	Old Hwy 56 & Harrison
	77	38500					197	98500			
	78	39000	16068	3220	Olathe Lake Discharge		198	99000	16068	3220	Olathe Lake Discharge
	79	39500					199	99500			
	80	40000	16069	3230	119th @ Cedar Creek		200	100000	16069	3230	119th @ Cedar Creek
	81	40500					201	100500			
	82	41000	16070	3240	K-10 @ Cedar Creek		202	101000	16070	3240	K-10 @ Cedar Creek
	83	41500					203	101500			
	84	42000	16071	3250	119th @ Little Cedar Creek		204	102000	16071	3250	119th @ Little Cedar Creek
	85	42500					205	102500			
	86	43000	16072	3260	95th @ Camp Creek		206	103000	16072	3260	95th @ Camp Creek
	87	43500					207	103500			
	88	44000	16073	3270	127th @ Cedar Creek		208	104000	16073	3270	127th @ Cedar Creek
	89	44500					209	104500			
Blue Valley Repeater 5 Sec	90	45000	16074	3280	Desoto Streamway Park	Blue Valley Repeater 5 Sec	210	105000	16074	3280	Desoto Streamway Park
	91	45500					211	105500			
	92	46000	16075	3290	75th & K-7		212	106000	16075	3290	75th & K-7
	93	46500					213	106500			
	94	47000	16076	3300	Gardner Lake Discharge		214	107000	16076	3300	Gardner Lake Discharge
	95	47500					215	107500			
	96	48000	16077	3310	143rd @ Kill Creek		216	108000	16077	3310	143rd @ Kill Creek
	97	48500					217	108500			
	98	49000	16078	3330	127th @ Kill Creek		218	109000	16078	3330	127th @ Kill Creek
	99	49500					219	109500			
	100	50000	16079	3340	95th @ Kill Creek		220	110000	16079	3340	95th @ Kill Creek
	101	50500					221	110500			
	102	51000	16080	3350	151st @ Spoon Creek		222	111000	16080	3350	151st @ Spoon Creek
	103	51500					223	111500			
	104	52000	16081	3360	102nd & Lexington Ave		224	112000	16081	3360	102nd & Lexington Ave
	105	52500					225	112500			
	106	53000	16082	3400	127th & Evening Star		226	113000	16082	3400	127th & Evening Star
	107	53500					227	113500			
Century Towers Repeater 5 Sec	108	54000	16083	3420	159th & Edgerton	Century Towers Repeater 5 Sec	228	114000	16083	3420	159th & Edgerton
	109	54500					229	114500			
	110	55000	16084	3440	191st & Dillie		230	115000	16084	3440	191st & Dillie
	111	55500					231	115500			
	112	56000	16085	3450	New Century Airport		232	116000	16085	3450	New Century Airport
	113	56500					233	116500			
	114	57000	16086	3460	Johnson County Transit Building		234	117000	16086	3460	Johnson County Transit Building
	115	57500					235	117500			
116	58000	16087	3470	Proposed Edgerton	236	118000	16087	3470	Proposed Edgerton		
117	58500				237	118500					
118	59000	16088	3480	Proposed 207th & Moonlight Rd	238	119000	16088	3480	Proposed 207th & Moonlight Rd		
119	59500				239	119500					

Managing TDMA Assignments

- Leave slots between repeaters
- Distribute sites across repeater frames
- Fill slots between repeaters from "bottom" up
- Maximize pre-assignment
- Keep master on an on-line platform
- Use master to generate out-of-slot alarms

Configuration Menu for BWD G201x Encoder

Use serial connection to terminal program using 57600 baud, N,8,1.
Power up unit and immediately press Enter twice to bring up menu

Set new-line on receive to LF only

Enter new parameter values or <CR>

Start serial boot loader to load new program ? 1 == Yes:

Load default configuration parameters & Save in non-volatile memory? 1 == Yes:

Enable Test Transmissions?

1 = continuous 1 KHz audio tone, 2 = continuous 1.2 KHz audio tone, 3 = ALERT2 transmission :

Enter GPS "patch mode" at startup? 1 == Yes:

** IND Configuration

IND Source Address (1...65534).....= 6,507 :

GPS (override) period (min).....= 30 :

GPS maximum on time (min).....= 5 :

Serial Port 0 Type (0 = API, 1 = ALERT).....= 0 :

Serial Port 0 baud (57600,38400,19200,9600,4800,1200)= 9,600 :

Serial Port 0 parity (0=none, 1=odd, 2=even)..= 0 :

Serial Port 0 stop bits (1, 2).....= 1 :

Serial Port 1 Type (0 = API, 1 = ALERT).....= 0 :

Serial Port 1 baud (57600,38400,19200,9600,4800,1200)= 9,600 :

Serial Port 1 parity (0=none, 1=odd, 2=even)..= 0 :

Serial Port 1 stop bits (1, 2).....= 1 :

Console Debug Output.....= 1 :

Low Power Mode.....= 0 :

Forced Test Message App PDU len (0-254).....= 200 :

Bit Clock Count (best = 370; adjustment added to 360= 10 :

** Originating Modem MANT Header Configuration

Default Destination Address (1...65534).....= 9,999 :

Add Time Service Request.....= 1 :

Add Path Service Request.....= 1 :

Hop Limit= 1 :

Add Destination Address= 0 :

Add Extra Header= 0 :

** Concentration Application Layer Protocol Configuration

Control Byte Test Payload Flag.....= 0 :

Control Byte Increment PDU ID Flag= 1 :

Control Byte Extra Header Flag.....= 0 :

** AirLink Media Access Configuration

Enable TDMA Media Access.....= 1 :

TDMA Frame length (millisec).....= 20,000 :

TDMA Frame Offset (millisec).....= 0 :

TX slot length (millisec).....= 3,000 :

TX slot time offset into Frame (millisec).....= 15,000 :

TX centered in slot.....= 0 :

TX minimum buffer in slot (millisec).....= 25 :

** AirLink Protocol Configuration

Transmitter always powered up.....= 0 (No) :

Transmitter power up time (millisec).....= 750 :

Transmitter Audio preload time (millisec).....= 100 :

Carrier Only Preamble time (millisec).....= 10 :

AGC Preamble time (millisec).....= 155 :

Transmission Postamble tail time (millisec)....= 5 :

Modulation Inverted.....= 0 :

AirLink first block size (V1.1=24, V1.0=17)?..= 24 :