

HydroLynx ALERT2 Training

How to upgrade your system to use the
ALERT2 protocol

ALERT2 Advantages

- Data rate increase from 300 to 4800 baud
- Data error detection and correction
- Data collision avoidance using TDMA
- Data resolution increase from 0-2047
- Data calibration in engineering units
- Station ID range expanded
- Transmitter time set from GPS
- Test mode sets flag for test data transmit

Plan migration from ALERT1 to ALERT2

- ALERT2 migration plan
 - ALERT2 radio frequency requirements
 - ALERT2 source addresses
 - ALERT2 TDMA frame length
 - ALERT2 TDMA slot assignments
- ALERT2 equipment upgrade
 - Upgrade base station to ALERT2
 - Upgrade field equipment to ALERT2
 - Retire ALERT1 radio equipment

ALERT2 Radio Frequency

- Radio frequency
 - Best to use a new radio frequency for ALERT2
 - Repeaters can receive ALERT1 on old frequency
 - Transmit ALERT1 on old frequency
 - Transmit ALERT2 on new frequency
 - Mixing ALERT1 and ALERT2 on the same frequency will result in data collisions
 - ALERT1 data loss and errors
 - ALERT2 data loss but errors are rejected

ALERT2 Source Address

- Station ID numbers (source address)
 - Station ID number must be regionally unique
 - Sensor ID numbers now range from 0 – 254
 - Data collection software will translate new station ID to store data report in database.
- Coordinate ALERT2 station IDs regionally
 - Station ID ranges may be assigned by county
 - Register station ID, location, time slot in AUG Ventura County database
 - Register station ID in NHWC ALERT2 SAMS

ALERT2 TDMA Frame Length

- TDMA frame length is the minimum time between station transmissions
 - A frame length of 1 minute allows a station to transmit data every minute if needed
- Stations do not transmit every frame cycle
 - Hourly timed reports will transmit within first frame in the hour
- When planning frame length, leave room for system expansion

ALERT2 TDMA Slot Length

- ALERT2 TDMA slot length
 - Stations transmit all sensor data within a 500ms (millisecond) slot length
 - Repeaters use longer 5000ms slot length
- 1 minute frame length must be large enough for all station and repeater slots
 - 120 stations with 500ms slot length
 - 80 stations with 500ms slot length and 4 repeater slots with 5000ms slot length

TDMA Slot Assignment Tips

- Start with repeater slots
- Position rain only stations near start of frame
 - No delay for sensor samples
- Position water level and weather station slots after 30 seconds
 - Allows time for SDI sample or sensor power on time

ALERT2 TDMA 1 Minute Frame

Slot	Offset (ms)	Length (ms)	Station
1	0	500	13001
2	500	500	13002
3	1000	1000	13003
4	1500		
5	2000	500	13004
6	2500	500	13005
...			
117	58000	500	
118	58500	500	13006
119	59000	500	
120	59500	500	13007

- ALERT2 transmitters only
 - 1 Minute Frame
 - Minimum slot length 500ms
 - Maximum slot length 1000ms
 - 120 500ms slots available
 - No repeater slots assigned

ALERT2 TDMA 1 Minute Mixed

Slot	Offset (ms)	Length (ms)	Repeater	Station
1	0	5000	60001	
10			60001	
11	5000	500		13001
12	5500	1000		13002
13	6000			
14	6500	500		13003
15	7000	500		13004
...				
31	15000	5000	60001	
40			60001	
41	20000	500		13005
42	20500	500		13006
...				
61	30000	5000	60001	
70			60001	
71	35000	500		13007
72	35500	500		13008
...				
91	45000	5000	60001	
100			60001	
101	50000	500		13009
102	50500	500		13010
...				
120	59500	500	13009	13011

- ALERT2 transmitter and repeater slots
 - 1 Minute Frame
 - Repeater slot length 5000ms
 - Station slot length 500 or 1000ms
 - 4 Repeater slots
 - 80 Station slots
 - 20 Stations repeated per repeater slot < 5 seconds

TDMA drift when GPS time lost

- ALERT2 encoder loses GPS lock
 - GPS time status set to drift
 - Change to random transmit time within frame
- Collisions can occur with stations that still have GPS lock
 - Greatest chance of collision for timed reports
 - ALERT2 transmitter can hold off timed transmission by one frame to reduce chance of collision

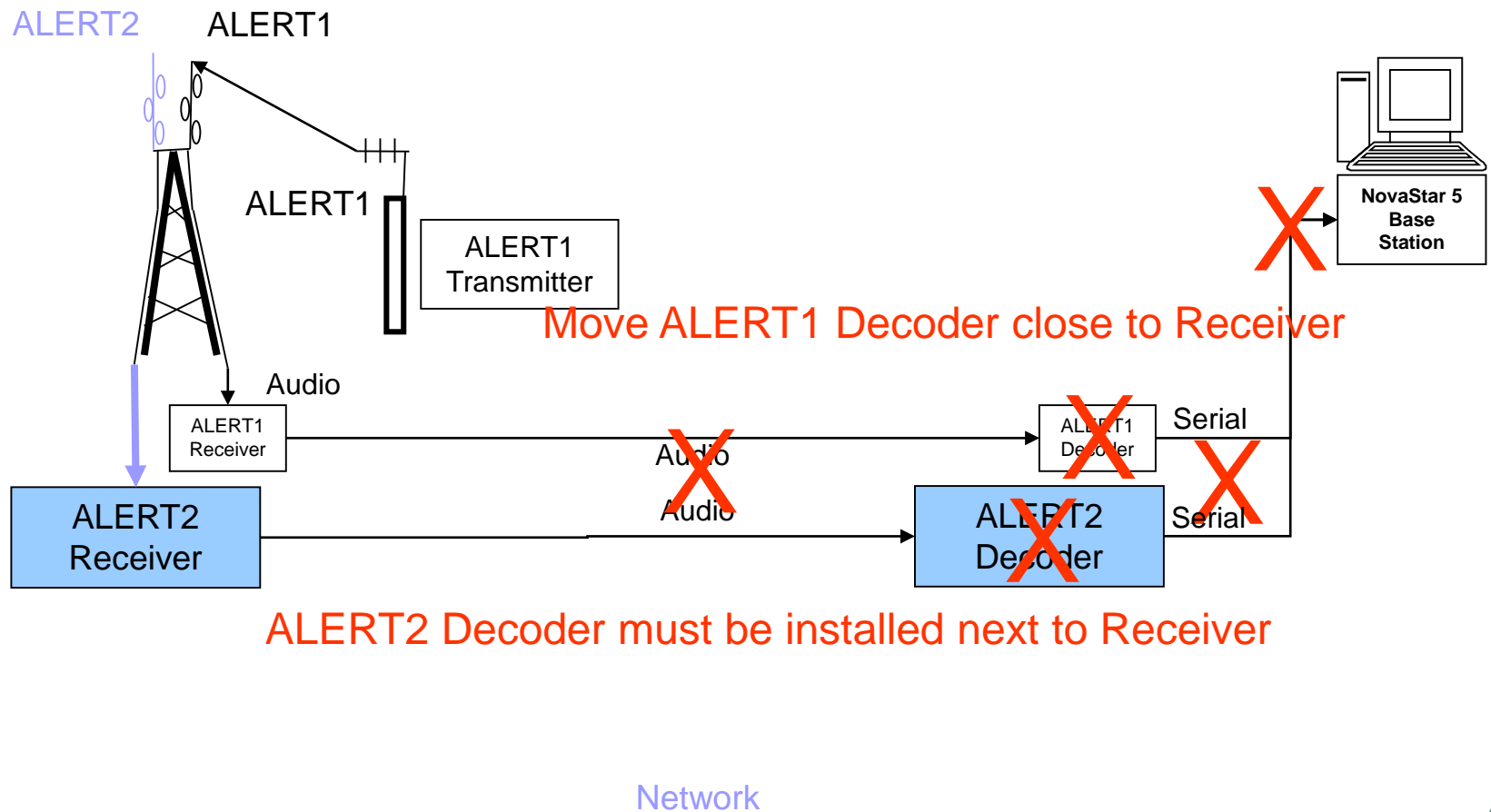
Upgrade base station

- Install ALERT2 base station receiver
 - Plan to collect ALERT1 and ALERT2 data during transition
- Upgrade to ALERT2 base station software
 - Base station software should have tools to analyze ALERT2 performance

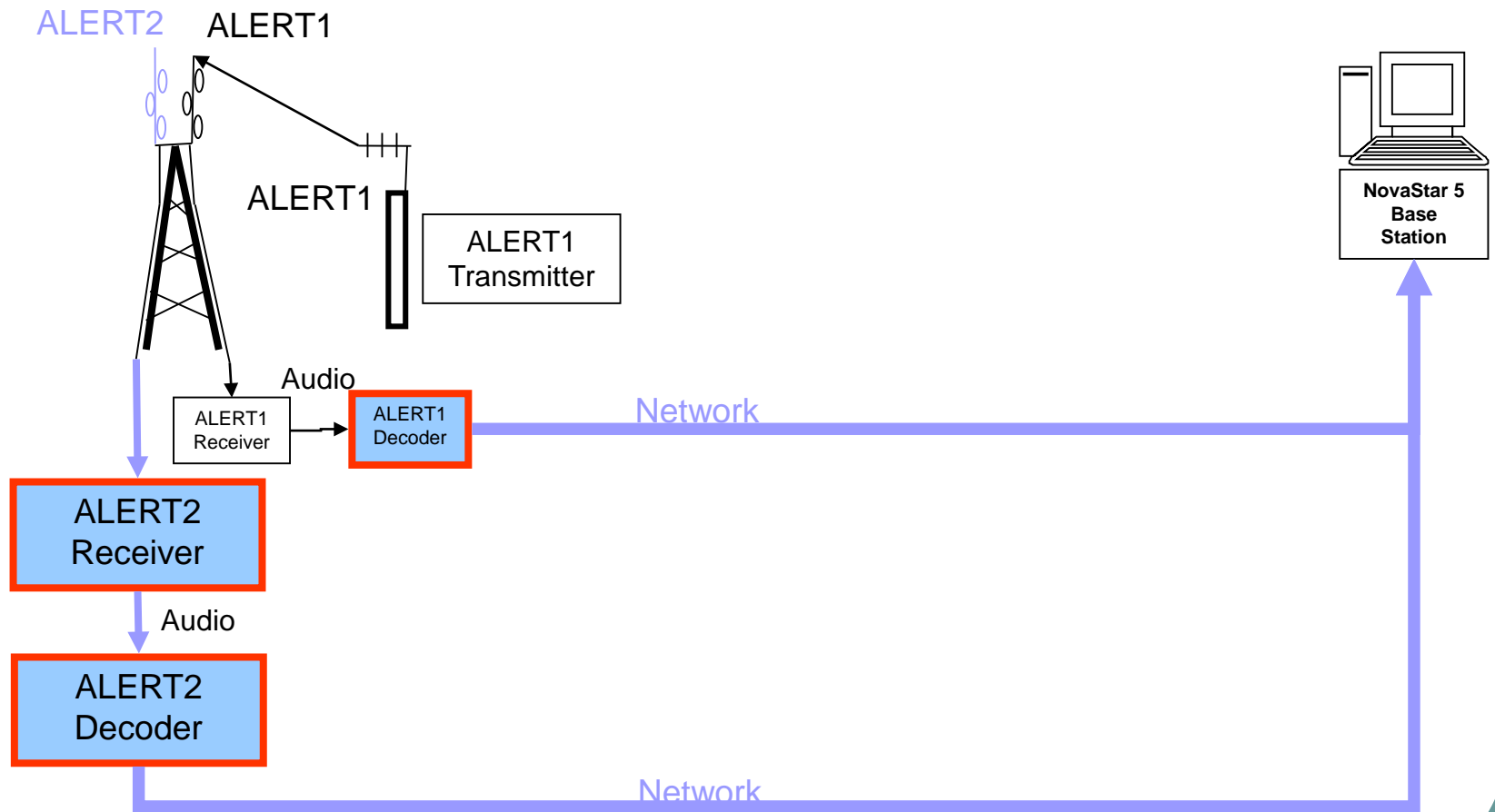
Install ALERT2 Base Station Receiver

- Upgrade base station to receive ALERT2
 - Receiver must be close to antenna
 - Decoder must be close to receiver to prevent signal loss on audio tone range
 - Provide for network connection between base station computer and ALERT2 decoder
- Upgrade base station ALERT1 connection
 - Move ALERT1 decoder close to ALERT1 receiver
 - Provide for network connection between base station computer and ALERT1 decoder
- Base station receives ALERT1 and ALERT2
 - Upgrade base station software for ALERT2 support

Install ALERT2 Base Station Receiver



Install ALERT2 Base Station Receiver



Upgrade to ALERT2 Base Station Software

- Base station software must support both ALERT1 and ALERT2 protocols
- Tools to analyze ALERT2 performance
 - Time of receipt as well as time of data
 - Source address of receiver and repeaters
 - GPS time lock status and alarm on drift
 - Detect missing packets using packet ID
 - Flag data when test flag set in packet

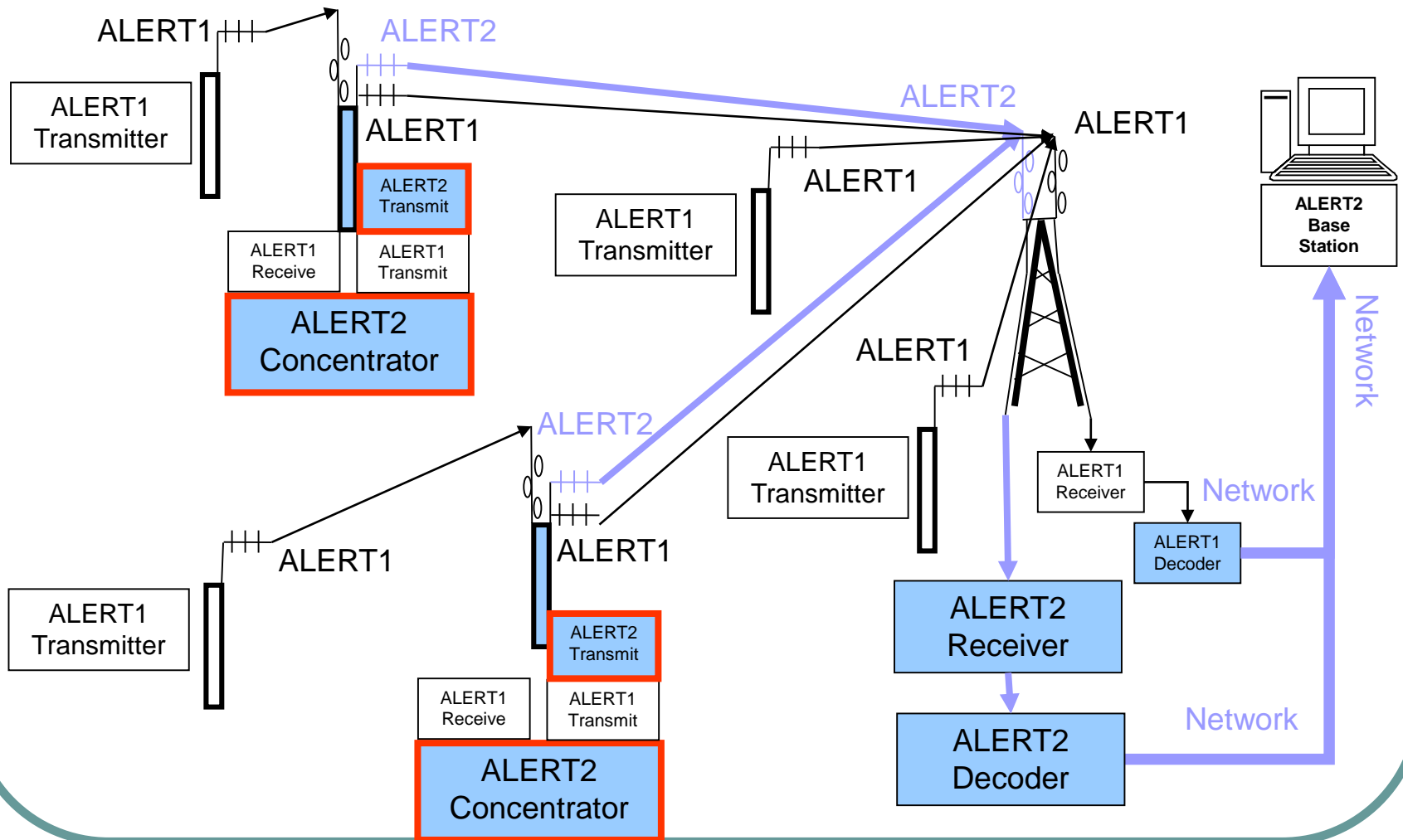
Upgrade field equipment

- Upgrade repeaters to ALERT2 concentrators
 - Receive ALERT1
 - Transmit ALERT1 and ALERT2
- Upgrade concentrators to ALERT2 repeaters
 - Receive ALERT1 and ALERT2
 - Transmit ALERT1 and ALERT2
- Upgrade ALERT1 transmitters to ALERT2 transmitters

Upgrade Repeaters to ALERT2 Concentrators

- Upgrade repeaters to add ALERT2 transmit to the base station
 - Receive ALERT1
 - Repeat ALERT1 and ALERT2 on separate antennas
- Repeat ALERT1 and ALERT2 to verify ALERT2 operation for evaluation period
 - Base station receives ALERT1 and ALERT2
 - Disable ALERT1 repeat when ALERT2 reliable

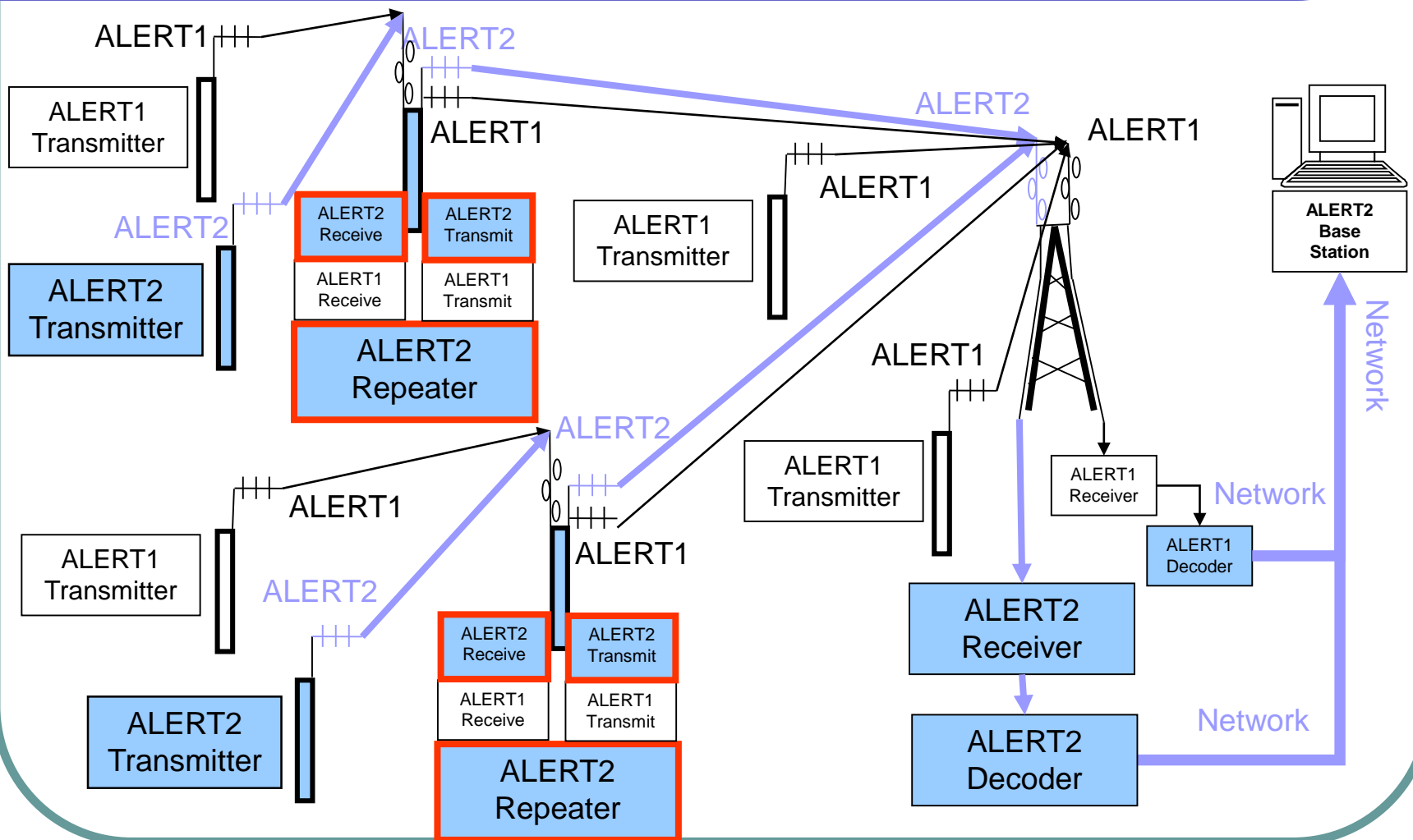
Upgrade Repeaters to ALERT2 Concentrators



Upgrade Concentrators to ALERT2 Repeaters

- Upgrade repeaters to add ALERT2 receive
 - Receive ALERT1 and ALERT2
 - Repeat ALERT1 and ALERT2
- Split single receive antenna input
 - ALERT1 radio receiver
 - ALERT2 radio receiver
- Separate transmit antennas
 - ALERT1 transmit
 - ALERT2 transmit

Upgrade Concentrators to ALERT2 Repeaters



Upgrade ALERT1 transmitters to ALERT2 transmitters

- Upgrade to ALERT2 transmitter
 - ALERT2 transmitter upgrade kit
 - ALERT2 modem board
 - GPS antenna with lightning arrestor
 - Firmware upgrade
 - ALERT2 transmitter replacement
 - Recommendations
 - 10W (600mA) solar panel, 18 Amp hour battery
 - Trim transmit antenna for ALERT2 frequency
 - Lightning arrestor for GPS antenna

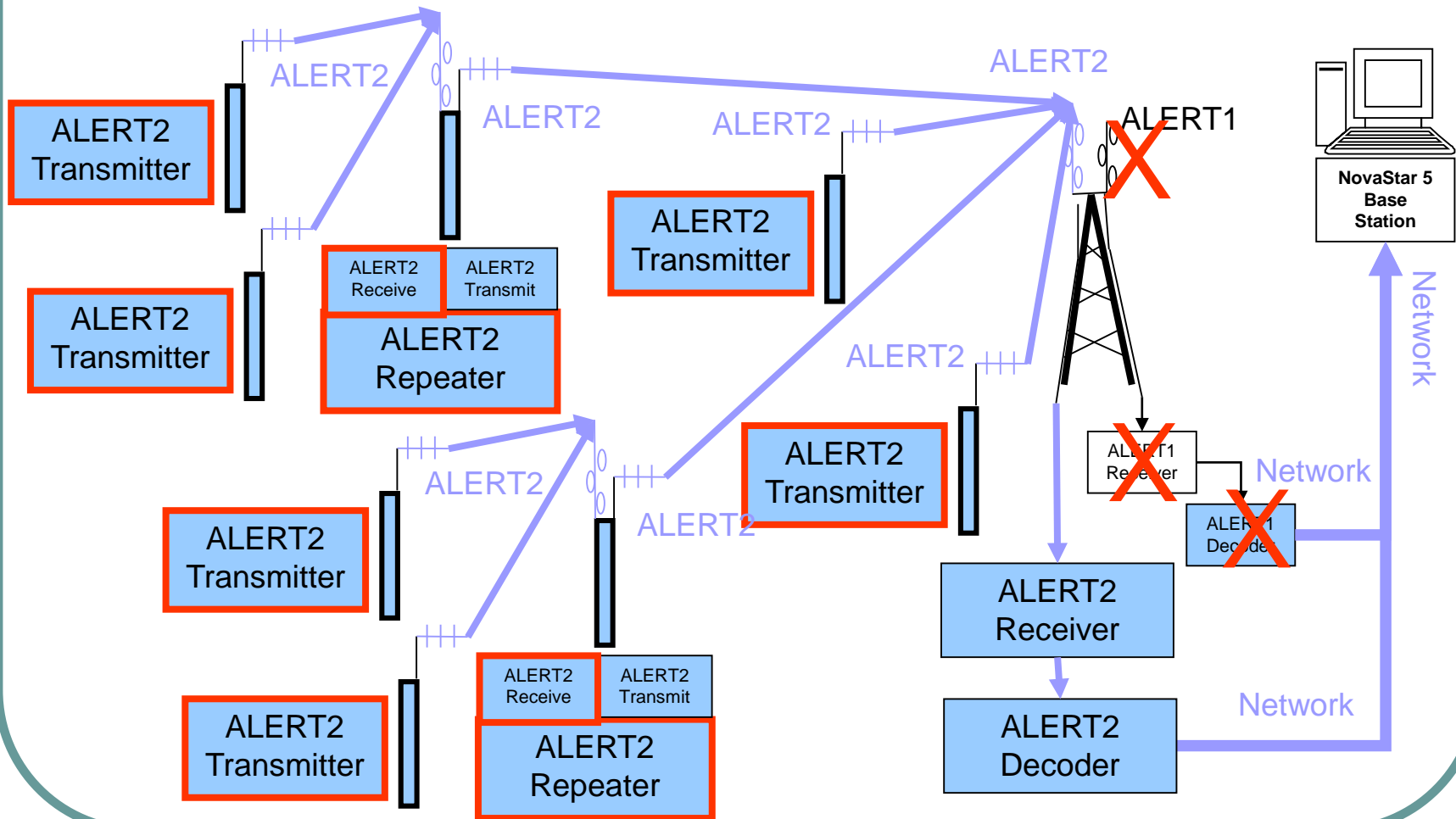
ALERT2 Transmitter Features

- Transmitter time sync with ALERT2 GPS
 - Transmit GPS time status as sensor data
- ALERT2 report types
 - GSR, TBR, MSR, finished data
- Test mode transmit ALERT2 test flag
 - Base station software flags test data
- Timed transmit holdoff on GPS time drift
 - Holdoff timed transmit for one frame length

Retire ALERT1 radio equipment

- After successful ALERT2 operational period
 - Retire ALERT1 on repeaters
 - Retire ALERT1 receive
 - Retire ALERT1 transmit
 - Retire ALERT1 on base station
 - Retire ALERT1 receiver

Retire ALERT1 radio equipment



Enjoy your error free data

HydroLynx Systems, Inc.
950 Riverside Pkwy., #10
West Sacramento, CA 95605
916-374-1800
hydro@hydrolynx.com
www.hydrolynx.com