

BROWNWOOD TEXAS AND BROWN COUNTY TEXAS JOINT DISPATCH CENTER AND COMMUNICATIONS UPGRADE PROJECT REQUEST FOR PROPOSAL

PROJECT DESCRIPTION

This project is to improve the public safety infrastructure radio systems in Brownwood, Texas and Brown County, Texas.

A complete study of the communications systems and capabilities of all public safety radio systems was started in May of 2019 and has been ongoing to the present day. Multiple reports of this study were presented to the city and county in the ensuing months.

The radio systems currently in place have serious issues. It is the intent of this Request for Proposal to perform construction of all tasks and components for Brownwood Texas and Brown County to have a superior communications system. Should any event happen within the jurisdiction of Brown County or sub divisions therein, there will be continuous communications so that there is always a clear line of Command and Control.

There are four major parts to this project. These are:

- Manufacturer discontinued equipment replacement.
- Radio Connectivity so that all public safety agencies in Brown County have reliable communications with dispatch and other units.
- Expansion of the number of tower radio sites from the current two tower radio sites to a total of eight tower radio sites.
- Providing for interoperability to handle any incident or situation.

FCC licensing will be completed before any work is to be performed, so items will not need to be delayed because of lack of FCC Authorizations to complete the tasks.

The following diagrams detail each radio component that needs replacement or upgrading to meet these goals. This project is divided into five (5) phases to meet immediate requirements and then to build out a complete county wide radio system that gives greatly increased coverage for mobile and portable units. Each phase builds upon the previous phase.

If the Vendor would like to suggest changes to these diagrams or designs, please feel free to do so, but label those changes as vendor additions and have the pricing for those additions as a separate section to your bids. Brownwood and Brown County are looking for a system that is reliable, efficient, and user friendly.

VENDOR REQUIREMENTS

The selected vendor must provide proof that it has successfully performed similar jobs for public safety agencies, is familiar with the technology being proposed, and has a radio shop that is located within a 4 hour drive to all of the sites listed in the RFP. In addition, the shop must have a minimum of 2 technicians that are certified as technicians, either by a trade organization, or by exam from the Federal Communications Commission.

The radio shop must have a minimum of 2 communications service monitors, power meters, and other test equipment as required.

The shop must be an authorized service provider by the manufacturer for each piece of equipment that is being proposed.

The selected vendor must provide proof of liability insurance, and workers compensation insurance that meets the minimum standards of Brownwood, Texas within 15 days of being selected.

The selected vendor must also provide 24/7 "on call" availability and the plan that they have in place if there are multiple after hour calls.

GENERAL INFORMATION

All equipment and associated materials are to be new and will have a warranty to be free of defects for a period of not less than 1 year starting on the date of system acceptance.

Vendor must not discriminate or tolerate harassment in the workplace.

The communications systems used in Brown County are critical for the needs and well being of the public safety officers and first responders. Any disruption of service must be coordinated with the designated contact person and with central dispatch at the LEC before any action is taken at any of the sites.

All tower work must have at least one person on the ground at all times for safety and comply with all associated tower safety protocols. Tower climbers shall be fully certified according to industry standards.

A maintenance fee schedule for years 1 through 5 must also be included as separate line items in the bid response.

VENDOR RESPONSE SHALL INCLUDE

- Company information
- Industry References
- Sub-contractors that will be used in this project
- Detail of equipment including specifications
- Manufacturer literature for proposed equipment
- Vendor proposed delivery and installation schedule as agreed with Requestor
- Supporting data that will include maps, diagrams and/or any other supporting information for clarification of this project
- Detailed pricing schedule for requested project including:
 - Quantity
 - Unit
 - Manufacturer
 - Model
 - Description
 - Unit Price
 - Extended Price
 - Sub Total Groups
 - Project Total
- Vendor suggested changes or additions

GENERAL INSTALLATION DETAILS

All equipment must be installed to good engineering standards and be compliant to the Motorola R56 installation standards or equivalent.

The equipment must be in cabinets with locking doors. All cable and power entrances to the cabinet must be protected from rodents or other pests having access to the cabinets.

Lightning protection must be provided on every cable, including the power lines and battery lines if external to the cabinets.

The cabinets must have an excellent electrical ground.

All radio transmission lines must have lightning protection with the ground lead going back to the main ground bus in each site.

All equipment and leads must be labeled such that maintenance technicians can easily identify each operating parameter and other items as pertinent for the maintenance of the equipment.

AWARD CRITERIA

In choosing a vendor to fulfill this project, the following items will be considered in this order:

1. Bidder responds to all specifications and bid requirements.
2. The Vendor has previous experience in the public safety communications market.
3. The Vendor has at least 5 Public Safety agencies providing satisfactory references.
4. The Vendor meets the Vendor Requirements as specified in this RFP.
5. The evaluation by Requestor that the Vendor has the ability to fulfill the requirements of the contract.

Requestor reserves the right to reject any and all proposals, to consider alternatives, and to re-solicit proposals should the entries not meet the requirements of this RFP.

Also, Requestor reserves the right to not make the award on the lowest cost bid, but for the best fit of the system requirements.

PAYMENT TERMS

Requestor will adhere to the follow payment schedule for this project per phase initiated:

35% upon Contract signing

15% upon delivery of equipment to Brownwood or Brown County

40% upon successful installation of all equipment

10% upon formal system acceptance and 60 days of flawless operation.

Payment terms are offered as a standard. More favorable terms would be appreciated.

ANTENNAS, DUPLEXERS, AND TRANSMISSION LINES

ANTENNAS

All antennas must be tested for proper band and frequency range, along with critical parameters measured and recorded.

All antennas must be mounted in such a way as to not interfere with other antennas and consideration should be made for the effects of tower shadowing on all side mounted antennas. The exact mounting locations for some of the antennas have not been determined at the time of the writing of this RFP.

Proper waterproofing of all outside connections is required.

DUPLEXERS

All VHF duplexers must have 70 dB or greater isolation, must be of a BAND PASS-BAND REJECT type, and be swept with a tracking generator before installing into the system.

TRANSMISSION LINES

All transmission lines must be properly terminated and swept with a Frequency Domain Reflectometer to confirm that the lines and terminations are properly connected.

All inter-bay jumper cables must be double shielded and also swept to confirm proper operation and loss for each cable. All testing must be recorded and archived.

LMR240UF and LMR400UF cables are acceptable for these cables.

GROUNDING AND LIGHTNING PROTECTION

GROUNDING

All equipment must be grounded.

All lines must have lightning protectors on them and the lightning protectors must be grounded.

All transmission lines must have at least 1 ground kit on the line near the point where the line leaves the tower, and on some sites, one at the top of the line near the antenna, and one at the bottom of the line just before it goes into the building or equipment cabinets.

LIGHTNING PROTECTION

All cables, power lines, control cables, or any other leads tied to the equipment must have the appropriate lightning protectors for the line being protected.

BACKUP POWER

All primary sites must be provided with back-up power that is not relay switched. The battery capacity must allow the stations to work for a minimum of 8 hours.

All stations should switch to low power when on backup battery power if that option is available.

The batteries must have a useful life of 5 years or better.

FACTORY OR VENDOR STAGING

As this system is quite complex, Requestor is insisting that the successful bidder of this project will assemble the entire system in the factory of the equipment manufacturer or in the vendor's shop where all cables will be pre-made, levels set, and a full set of system documentation provided as part of the factory staging.

FINAL ACCEPTANCE TEST

A final acceptance test (FAT) will be performed that tests all functions of the new systems and will be recorded.

NOTE: The FCC Licensing will be started before the award of the system, so the FCC assigned frequencies for the systems should be set before this FAT is performed. Should the FCC Authorizations not be granted by the time that the FAT is to be performed, alternate channels will be provided for the different systems

MANUALS

There shall be a full set of paper manuals for each piece of equipment at each site, and an additional set of manuals in soft copy to be provided for each piece of equipment. In addition, there should be a system diagram available at each site and available in soft copy for maintenance and expansion purposes.

SYSTEM OPTIMIZATION

Each component and each separate system shall be optimized for proper levels to insure that every component is meeting required specifications. The results of these tests will be recorded and placed into the station records.

CURRENT SYSTEM STATUS

Dispatch

- System unreliable
- Limited number of channels – maxed out
- Raised floor inaccessible
- Lighting is poor
- Air conditioning and heating is marginal
- Four (4) dispatch positions at LEC

Brown County Sheriff's Department

- Current coverage for mobiles is not sufficient
- Current coverage for portable radios is non-existent in areas
- RF interference from fire alarm channel
- Vehicles exhibit poor installation and maintenance of radios and antenna

City of Brownwood

- Limited coverage for PD
- Limited coverage for FD
- Limited coverage for IT
- Limited coverage for Utilities

VFD

- Limited coverage in multiple parts of Brown County
- Non-existent portable coverage

Other cities

- Bangs – Multiple issues
- Early – Multiple issues

Brown County Mobile Command Trailer

The Mobile Command Trailer is under the direction of the Brown County Sherriff's Department. Current configuration includes:

- 6 - Mobile Radios
- 1 - VHF Repeater
- 2 - Zetron Consoles
- Telex IP-223 units are used to bridge the consoles to the radios

PROJECT PHASES

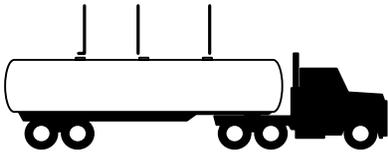
PHASE 0

- This is a diagram of the current system
- There are 11 analog controlled radios at the Law Enforcement Dispatch Center (LEC) and one radio tower site (Round Mountain), plus a short (60 ft) tower at the LEC for limited coverage around the LEC
- The current dispatch console is IP and uses Telex IP-223 analog to IP converters to interface with the 11 radios at the LEC
- There are currently four (4) dispatch positions at the LEC
- A fifth dispatch position (backup) exists at Brownwood Fire Station #1

Mobile Command Trailer:

- 6 - Mobile Radios
- 1 - VHF Repeater
- 2 - Zetron Consoles
- Telex IP-223 units are used to bridge the consoles to the radios

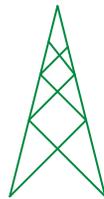
BROWNWOOD TX CITY AND BROWN COUNTY RADIO SYSTEM TOPOLOGY PHASE 0 EXISTING SYSTEM



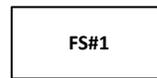
MOBIL COMMAND TRAILER

- 6 – Mobile Radios
- 1 - VHF Repeater
- 2 - Zetron Consoles

- SO1 RX
- PD1 RX
- UHF BASE
- 700 BASE
- 800 BASE
- VHF IC BASE
- SO1 CTL LP
- FD1 CTL LP
- PD1 CTL LP
- UTIL CTL LP
- FD2 CTL LP

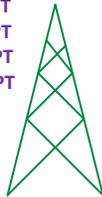


**LEC
60 FT TWR
CONSOLE POS. 1-4
CONNECTED VIA IP**



**CONSOLE POS. 5
CONNECTED VIA IP**

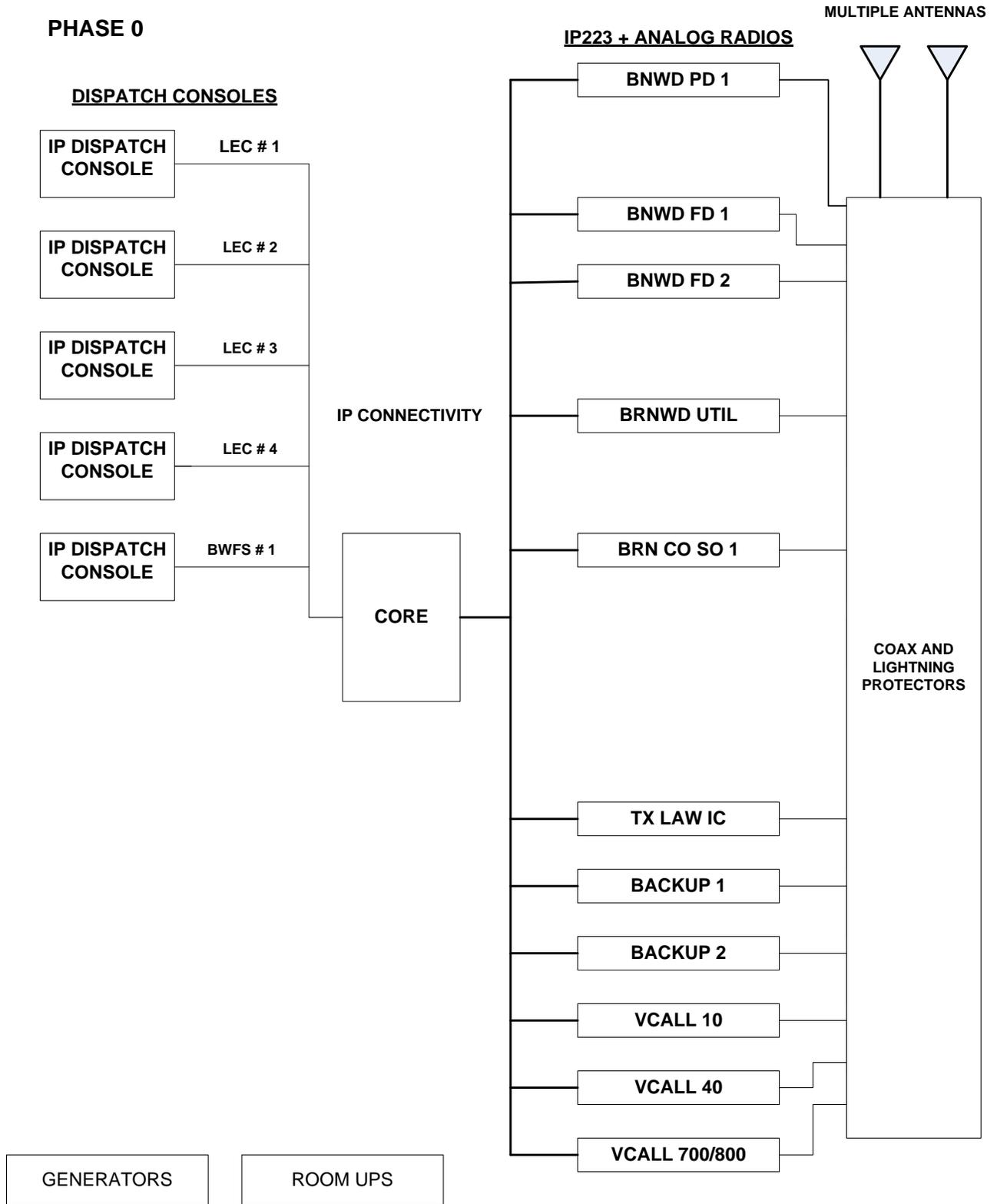
- SO1 RPT
- FD1 RPT
- PD1 RPT
- UTIL RPT
- ITOP RPT



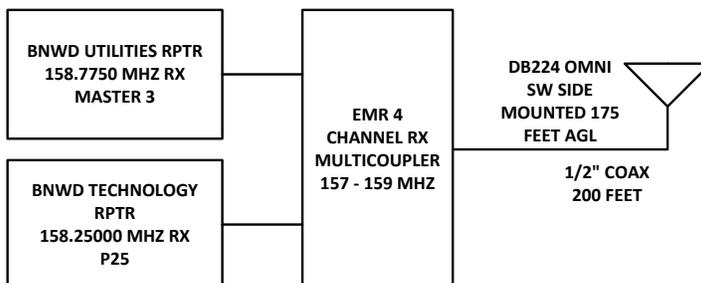
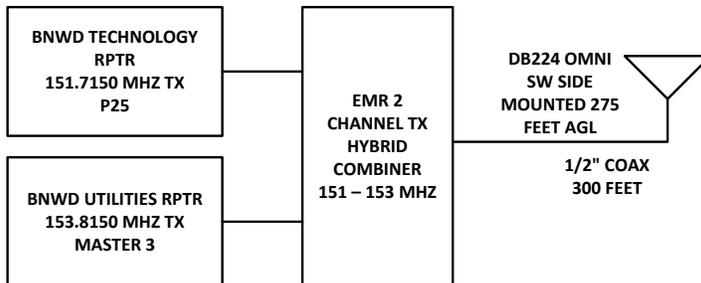
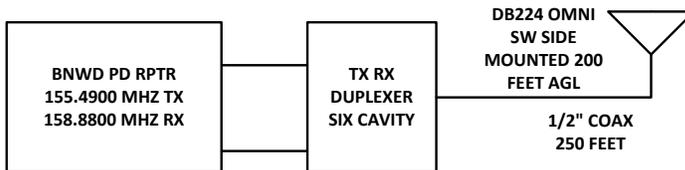
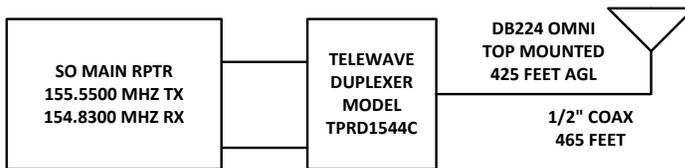
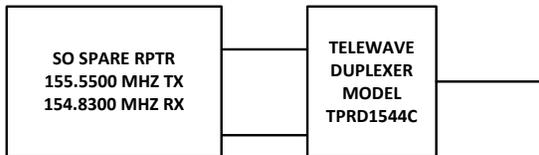
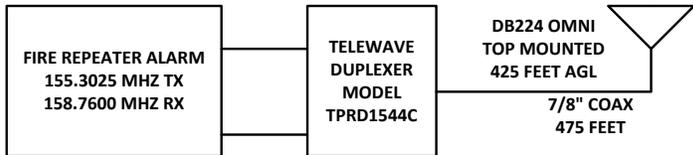
**ROUND
MTN
400 FT TWR**

BROWN COUNTY / BROWNWOOD TEXAS COMBINED PUBLIC SAFETY DISPATCH SYSTEM

PHASE 0



CITY OF BROWNWOOD ROUND MOUNTAIN TOWER SITE



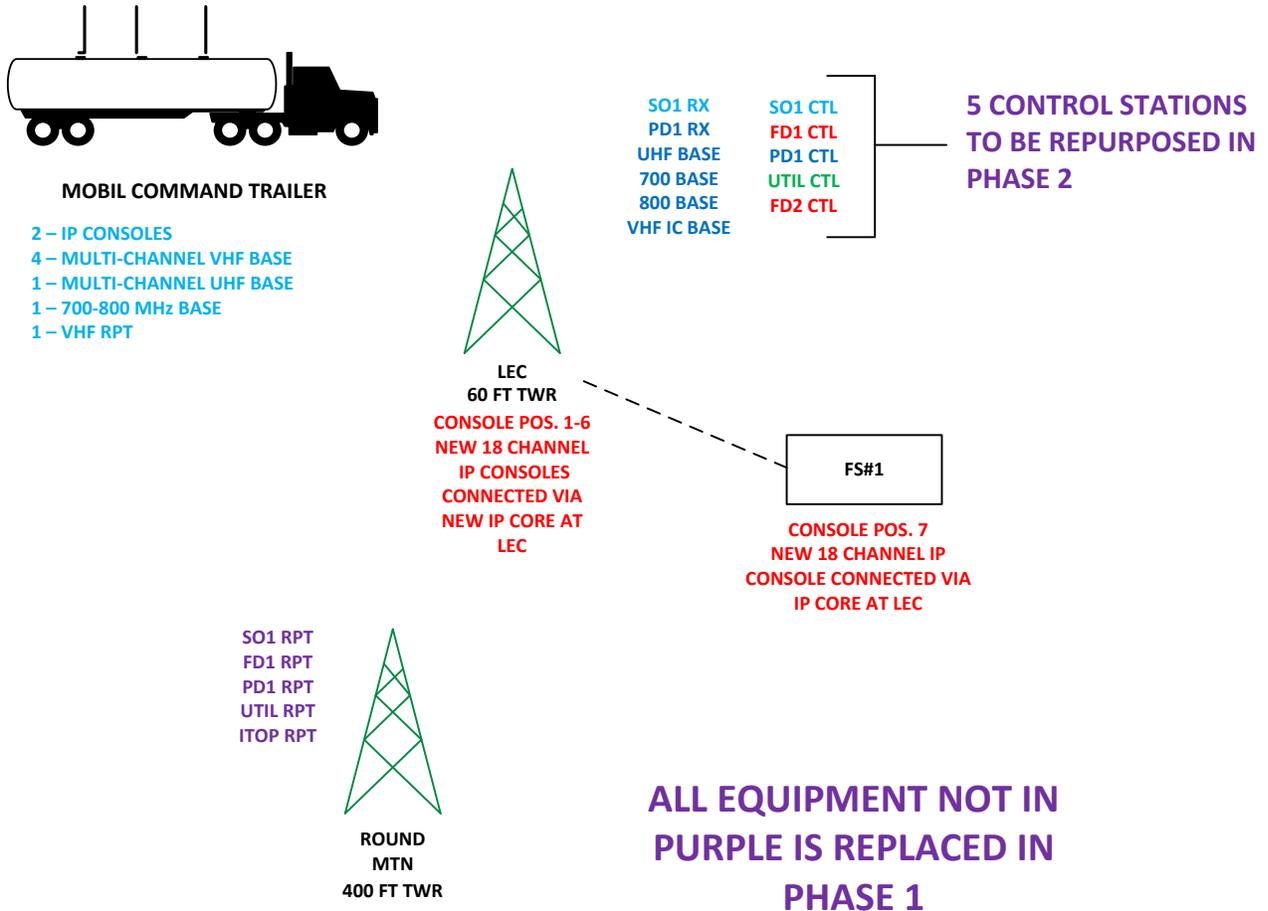
PHASE 1

- Install 7 IP dispatch consoles (6 at the LEC and 1 at Brownwood Fire Station #1) and a Core CPU to interconnect the new IP hardware
- Install 11 IP radios at dispatch
- Raised Flooring should be replaced - currently inaccessible
- Upgrade furniture for total of six (6) dispatch positions
 - Keyboards
 - Computers and Other Components
 - Monitors
 - Microphones
 - Head Sets
 - Speakers
 - Battery Backups
 - Dispatcher Chairs
- Upgrade dispatch area lighting
- Upgrade dispatch area heating and air conditioning to accommodate increased equipment and personnel

UPGRADE MOBIL COMMAND TRAILER

- Install 2 IP consoles
- Install 4 multi-channel VHF Base IP radios
- Install 1 multi-channel UHF Base IP radio
- Install 1 700-800 MHz Base IP radio
- Install 1 VHF Repeater

BROWNWOOD TX CITY AND BROWN COUNTY RADIO SYSTEM TOPOLOGY PHASE 1 REPLACE CONSOLES AND LEC RADIOS WITH IP RADIO COMPATIBLE EQUIPMENT

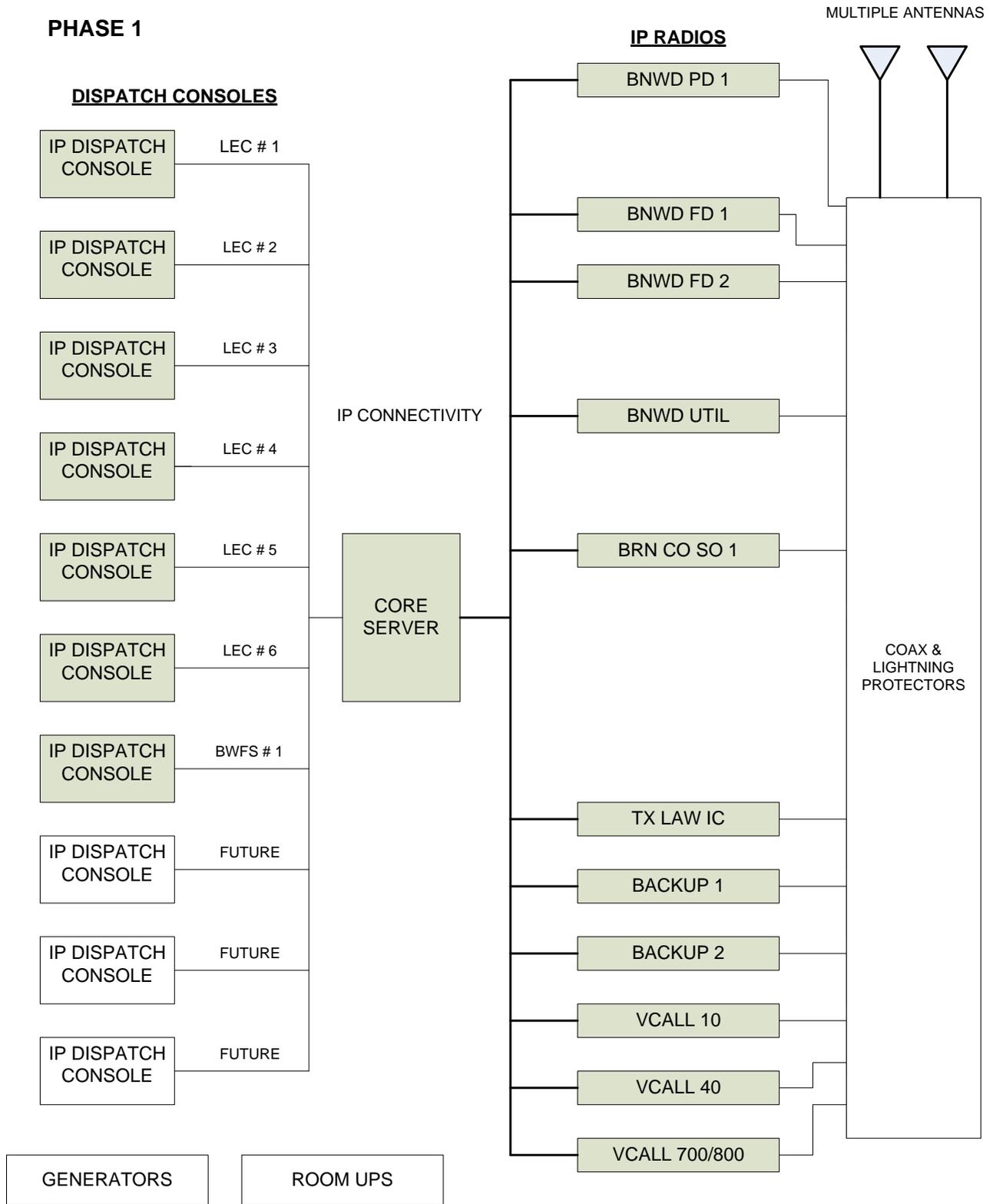


PHASE 1 COMPONENTS

- 9 EACH 18 CHANNEL IP CONSOLES
- 1 EACH IP CORE
- 13 EACH VHF 100 WATT STATIONS
- 2 EACH UHF 100 WATT STATION
- 1 EACH 700 MHZ 50 WATT STATION
- 1 EACH 800 MHZ 50 WATT STATION
- 1 EACH 700/800 MHz BASE
- 1 EACH VHF REPEATER

BROWN COUNTY / BROWNWOOD TEXAS COMBINED PUBLIC SAFETY DISPATCH SYSTEM

PHASE 1



PHASE 2

- Add WCW Greenleaf tower and WCW Bangs tower
- Add microwave system from LEC to WCW Greenleaf tower
- Add microwave system from LEC to Round Mountain tower
- Add microwave system from Round Mountain tower to WCW Bangs tower
- Add microwave system from WCW Greenleaf tower to Round Mountain tower
- Move IP radios (FD2, PD1, UTIL) except Fire Alarm Channel FD1 from LEC to WCW Greenleaf tower and convert these radios from control stations to repeaters
- Add new IP repeater for ITOP at WCW Greenleaf tower
- Move Fire Alarm Channel FD1 from LEC to Round Mountain tower and upgrade to simulcast downlink and voting uplink channels
- Add new Fire Alarm FD1 IP repeater to WCW Bangs tower
- Add Bangs PD IP repeater to WCW Bangs tower
- Add SO1 and PD1 IP base radios with simulcast downlink and voting uplink at LEC (Reconfigured RX radios)
- Add equipment building, generator, and UPS at WCW Greenleaf tower
- Add equipment building, generator, and UPS at WCW Bangs tower

SEE SYSTEM DETAIL PHASE 2A

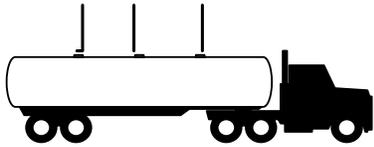
- Add microwave system Brownwood City Hall to WCW Greenleaf tower
- Add microwave system Brownwood Fire Station #1 to WCW Greenleaf tower

NOTE: ALL SO1, SO2 AND FD1 (ALARM CHANNEL) RADIOS THAT SHARE THE SAME FREQUENCIES FROM THIS PHASE FORWARD WILL BE SIMULCAST TRANSMIT AND RECEIVER VOTED SO THAT THE SYSTEMS BECOME WIDE AREA AND CONSERVE VALUABLE RADIO SPECTRUM

PLEASE QUOTE AS OPTION:

ALL ADDITIONAL CHANNELS USED AT MORE THAN ONE (1) SITE IN THIS DESIGN - PLEASE QUOTE FOR SIMULCAST AND RECEIVER VOTING.

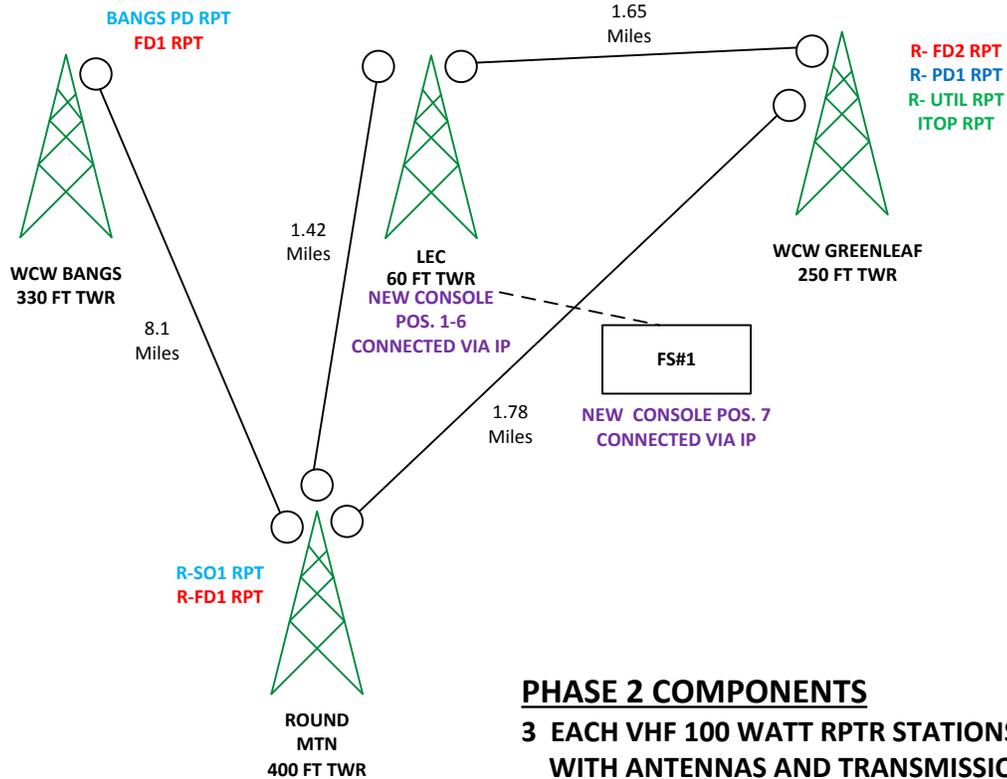
BROWNWOOD TX CITY AND BROWN COUNTY RADIO SYSTEM TOPOLOGY PHASE 2



MOBIL COMMAND TRAILER

- 2 - CONSOLES
- 4 - MULTI-CHANNEL VHF BASE
- 1 - MULTI-CHANNEL UHF BASE
- 1 - 700-800 MHz BASE
- 1 - VHF RPTR

- SO1 BASE
- PD1 BASE
- UHF BASE
- 700 BASE
- 800 BASE
- VHF IC BASE

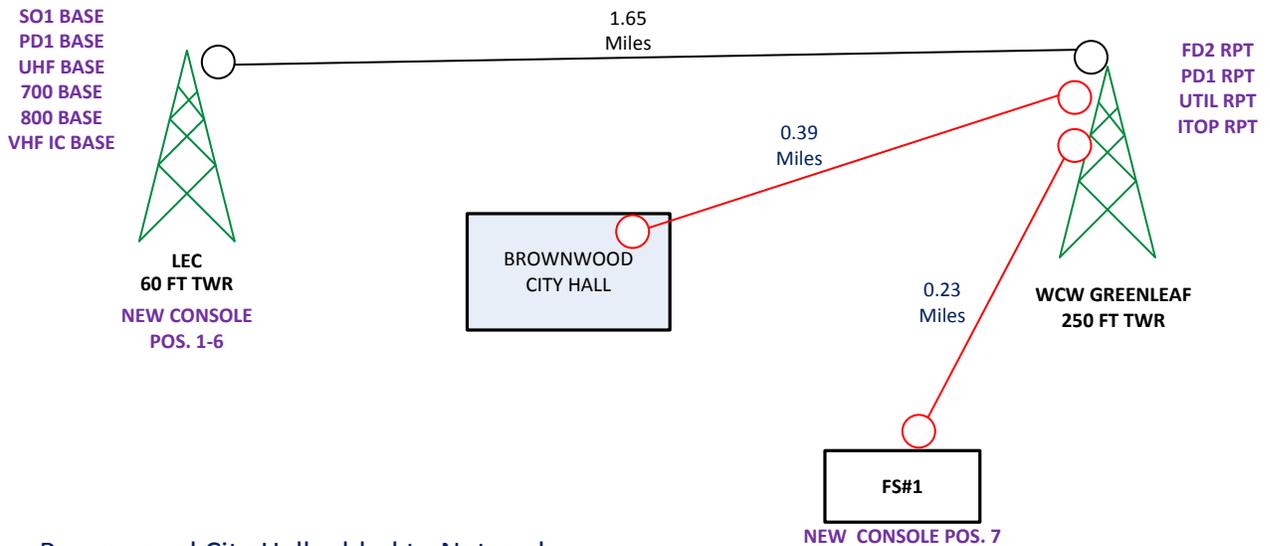


PHASE 2 COMPONENTS

- 3 EACH VHF 100 WATT RPTR STATIONS WITH ANTENNAS AND TRANSMISSION LINES**
- 4 EACH HOPS MICROWAVE**
- 2 EACH EQUIPMENT BUILDINGS**
- 2 EACH UPS SYSTEMS**
- 2 EACH GENERATORS**

R- = REPURPOSED RADIOS FROM PHASE 1

BROWNWOOD TX CITY AND BROWN COUNTY RADIO SYSTEM TOPOLOGY PHASE 2A

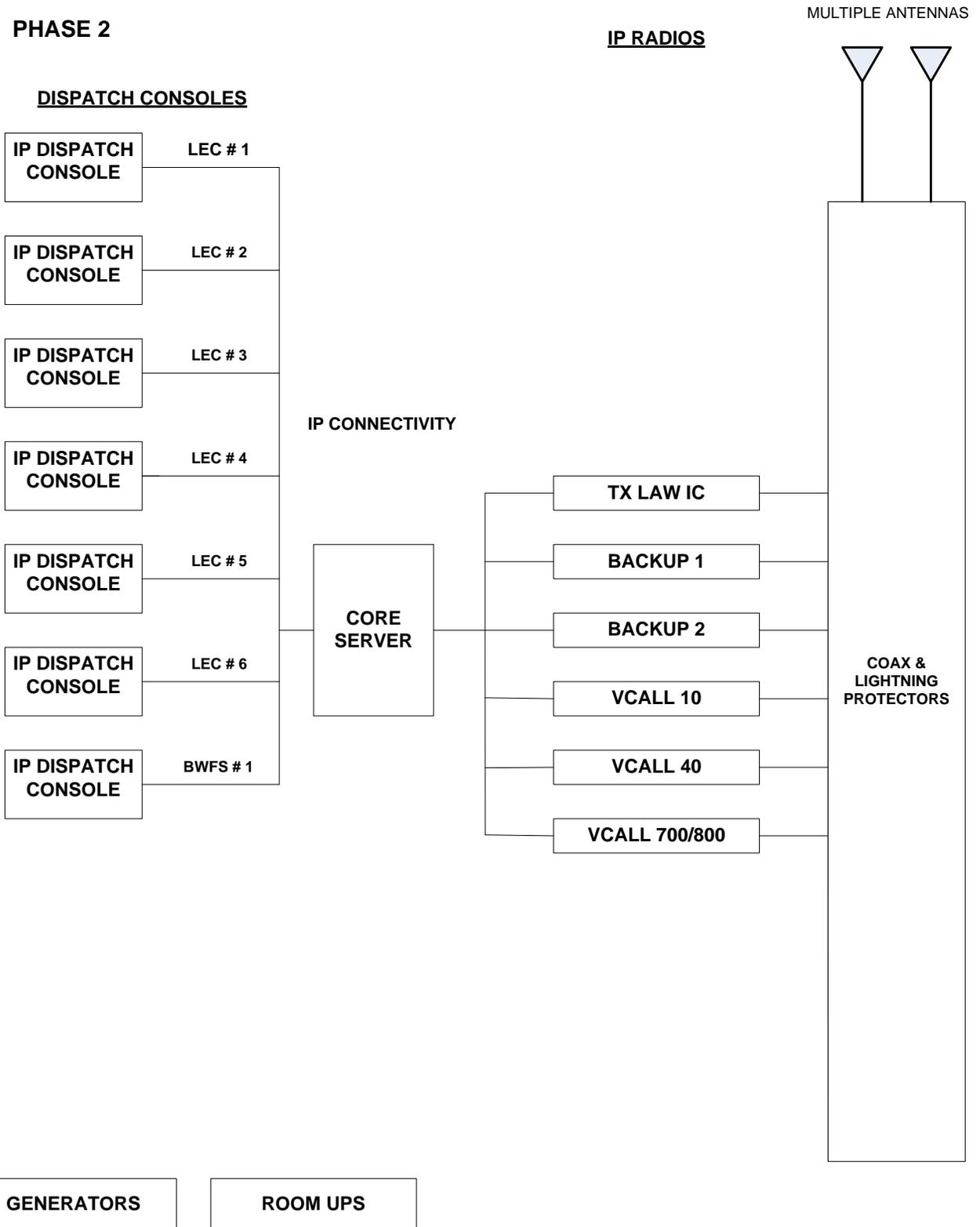


- Brownwood City Hall added to Network
 - Network Monitoring
 - Network Programming
 - Internet Connection – Remote Diagnostics and Software Upgrades (Only as Needed)
- Brownwood Fire Station #1 added to Network
 - Eliminate Ubiquiti Link
 - Keep Equipment Consistant
 - Connect Console Position 7 – (Backup)

PHASE 2A COMPONENTS
2 EACH HOPS MICROWAVE
2 EACH ROUTERS

BROWN COUNTY / BROWNWOOD TEXAS COMBINED PUBLIC SAFETY DISPATCH SYSTEM

PHASE 2



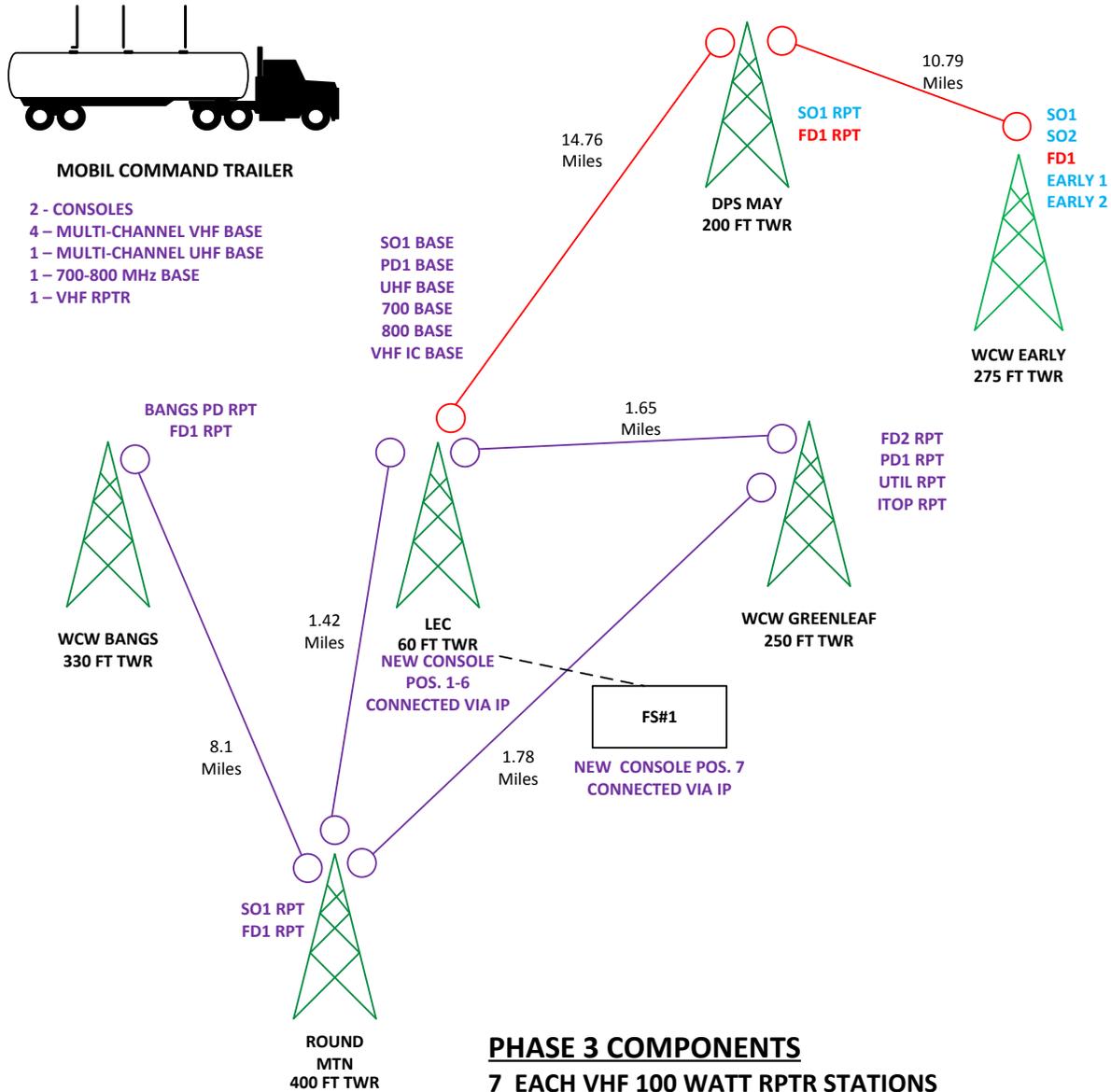
PHASE 3

- Add DPS May tower
- Add microwave from LEC tower to DPS May tower
- Add simulcast and receiver voting IP radios for SO1 and FD1 at DPS May tower
- Add UPS system for new radios at DPS May tower
- The existing building and generator at DPS May tower should be sufficient for new equipment - please confirm
- Add WCW Early Tower
- Add microwave from DPS May tower to WCW Early tower
- Add simulcast and receiver voting IP radios for SO1, SO2 and FD1 at WCW Early tower
- Add Early 1 and Early 2 repeater radios at WCW Early tower
- Add equipment building, generator, and UPS at WCW Early tower

SEE SYSTEM DETAIL PHASE 3A

- Add microwave system Early City Hall to WCW Early tower

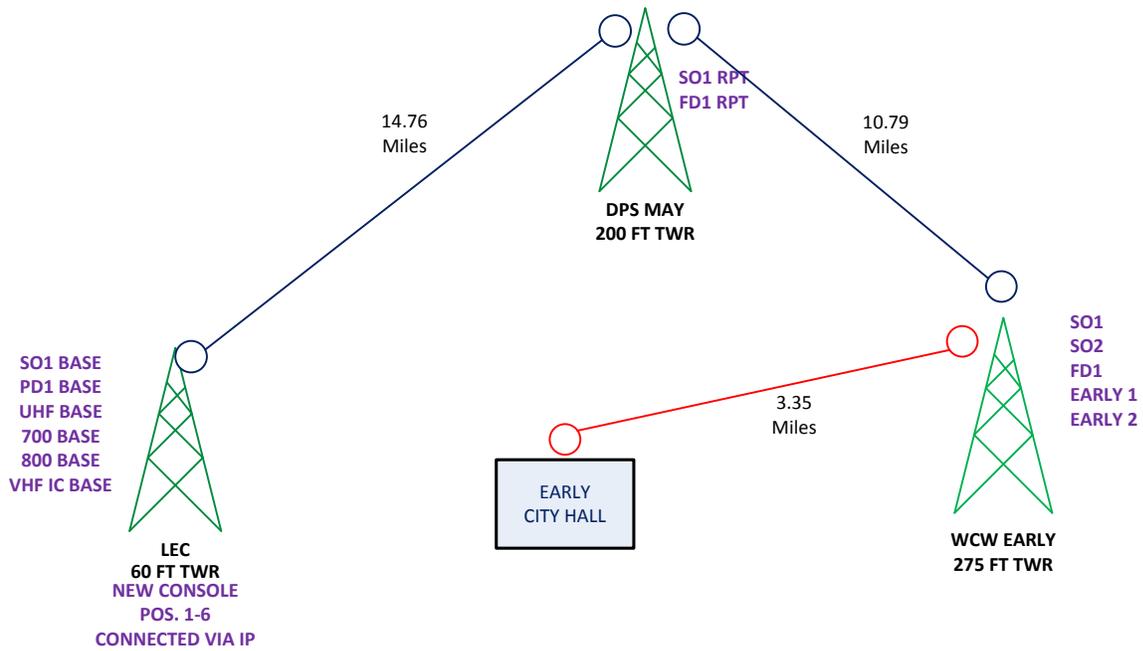
BROWNWOOD TX CITY AND BROWN COUNTY RADIO SYSTEM TOPOLOGY PHASE 3



PHASE 3 COMPONENTS

- 7 EACH VHF 100 WATT RPTR STATIONS WITH ANTENNAS AND TRANSMISSION LINES
- 2 EACH HOPS MICROWAVE
- 1 EACH EQUIPMENT BUILDINGS - EARLY
- 2 EACH UPS SYSTEMS
- 1 EACH GENERATOR - EARLY

BROWNWOOD TX CITY AND BROWN COUNTY RADIO SYSTEM TOPOLOGY PHASE 3A

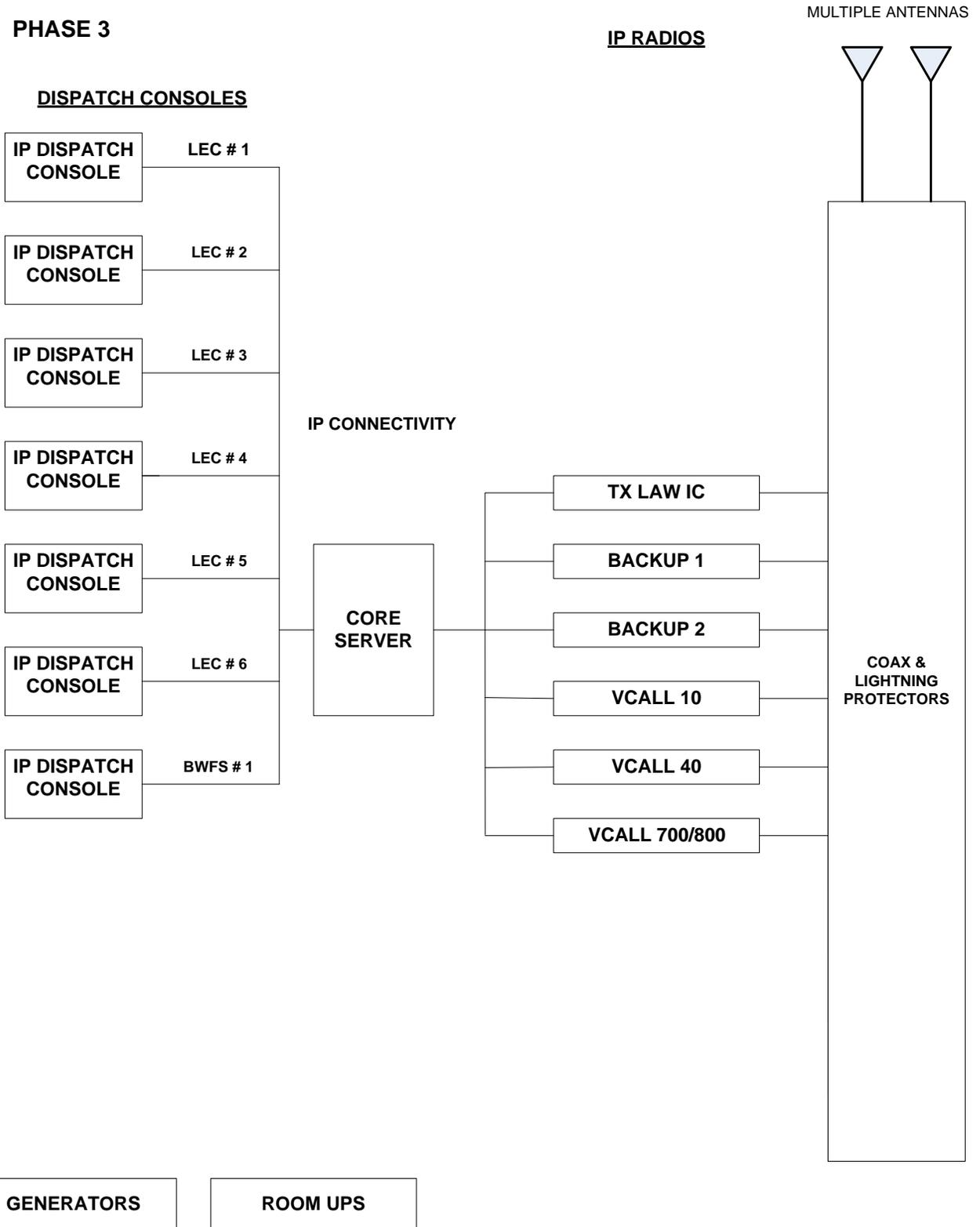


PHASE 3A COMPONENTS

- 1 HOP MICROWAVE
- 1 ROUTER
- 1 VHF IP RADIO WITH ANTENNA AND TRANSMISSION LINE

BROWN COUNTY / BROWNWOOD TEXAS COMBINED PUBLIC SAFETY DISPATCH SYSTEM

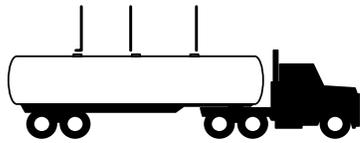
PHASE 3



PHASE 4

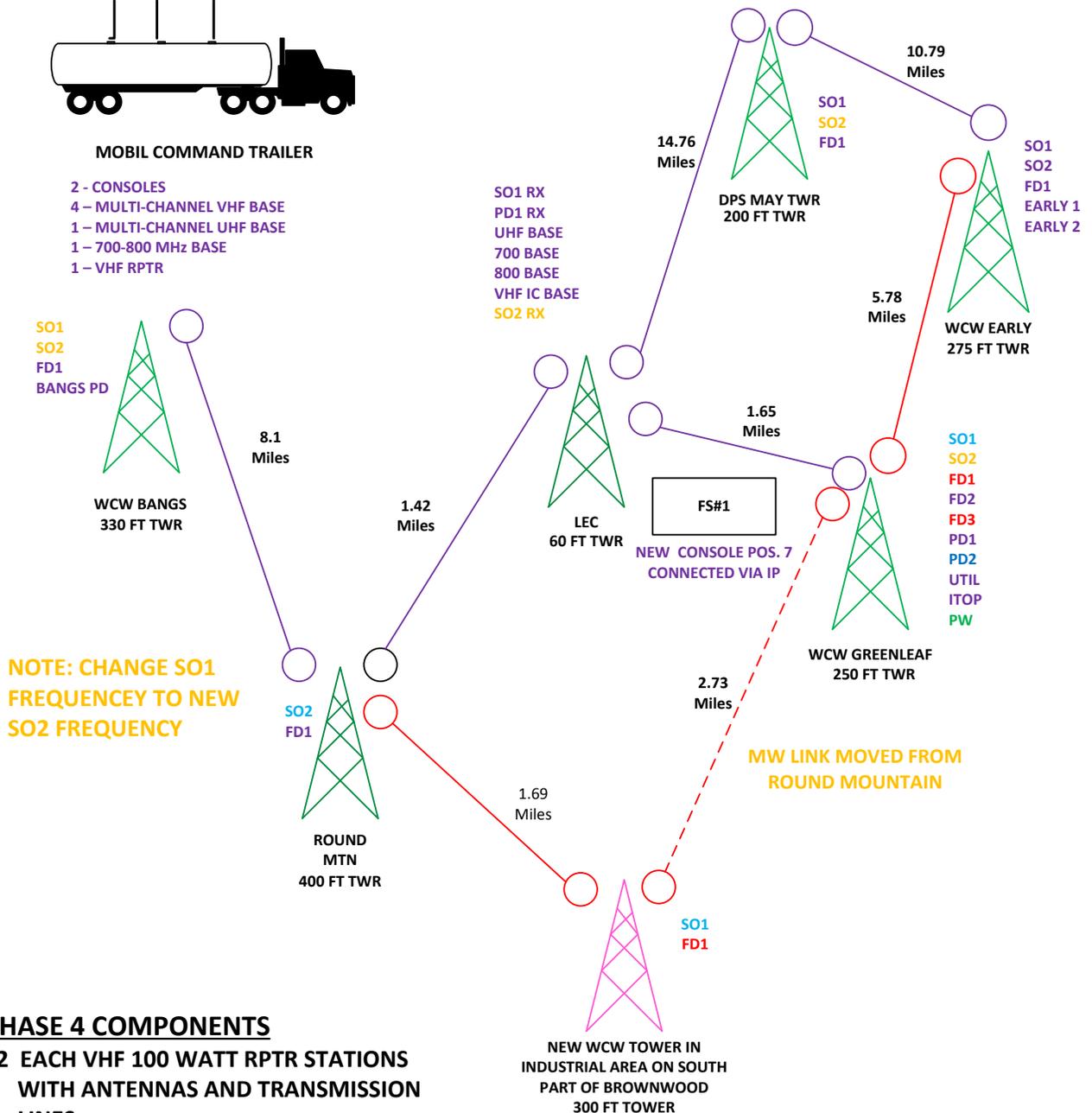
- Add WCW tower at Industrial area
- Add SO1 repeater at WCW tower in Industrial area
- Add FD1 repeater at WCW tower in Industrial area
- Add equipment building, generator, and UPS at WCW Industrial Area tower
- Add microwave ring to city system (Move Greenleaf to Round Mountain hop from Round Mountain tower to WCW tower in Industrial area and add new microwave hop from WCW Industrial area tower to Round Mountain tower)
- Change the SO1 channel at the Round Mountain site to SO2 (new channel)
- Add SO1 repeater at WCW Bangs tower site
- Add SO2 repeater at WCW Bangs tower site
- Add SO2 at LEC
- Add SO1 repeater at WCW Greenleaf tower site
- Add SO2 repeater at WCW Greenleaf tower site
- Add FD1 Fire Alarm repeater at WCW Greenleaf tower
- Add City of Brownwood FD3 repeater at WCW Greenleaf tower
- Add City of Brownwood PW repeater at WCW Greenleaf tower
- Add City of Brownwood PD2 repeater at WCW Greenleaf tower
- Add SO2 repeater at DPS May tower site (Shift to Phase 3)

BROWNWOOD TX CITY AND BROWN COUNTY RADIO SYSTEM TOPOLOGY PHASE 4



MOBIL COMMAND TRAILER

- 2 - CONSOLES
- 4 - MULTI-CHANNEL VHF BASE
- 1 - MULTI-CHANNEL UHF BASE
- 1 - 700-800 MHz BASE
- 1 - VHF RPTR

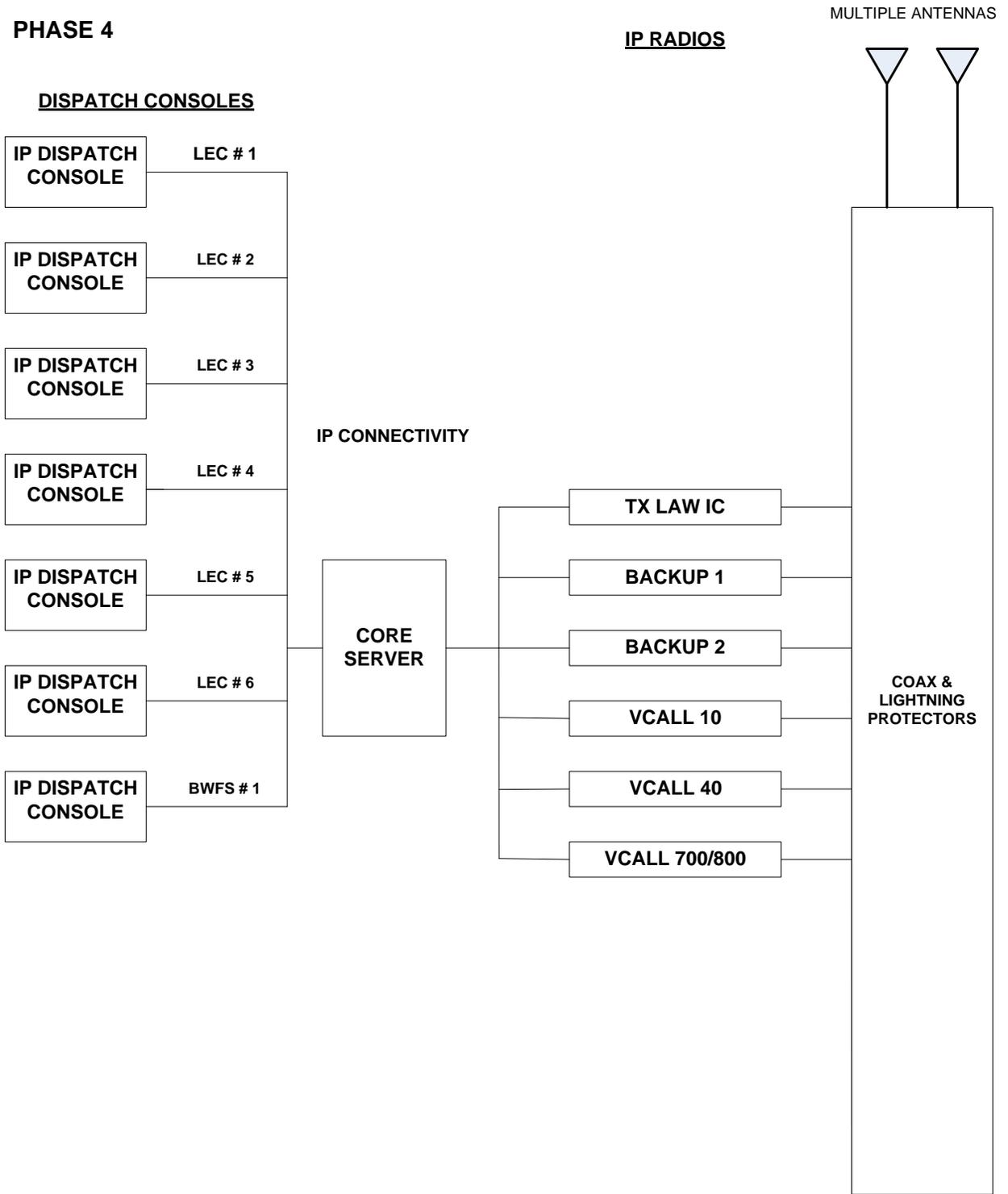


PHASE 4 COMPONENTS

- 12 EACH VHF 100 WATT RPTR STATIONS WITH ANTENNAS AND TRANSMISSION LINES
- 2 EACH HOPS MICROWAVE
- 1 EACH EQUIPMENT BUILDINGS - INDUSTRIAL
- 1 EACH UPS SYSTEM
- 1 EACH GENERATOR - INDUSTRIAL

BROWN COUNTY / BROWNWOOD TEXAS COMBINED PUBLIC SAFETY DISPATCH SYSTEM

PHASE 4



GENERATORS

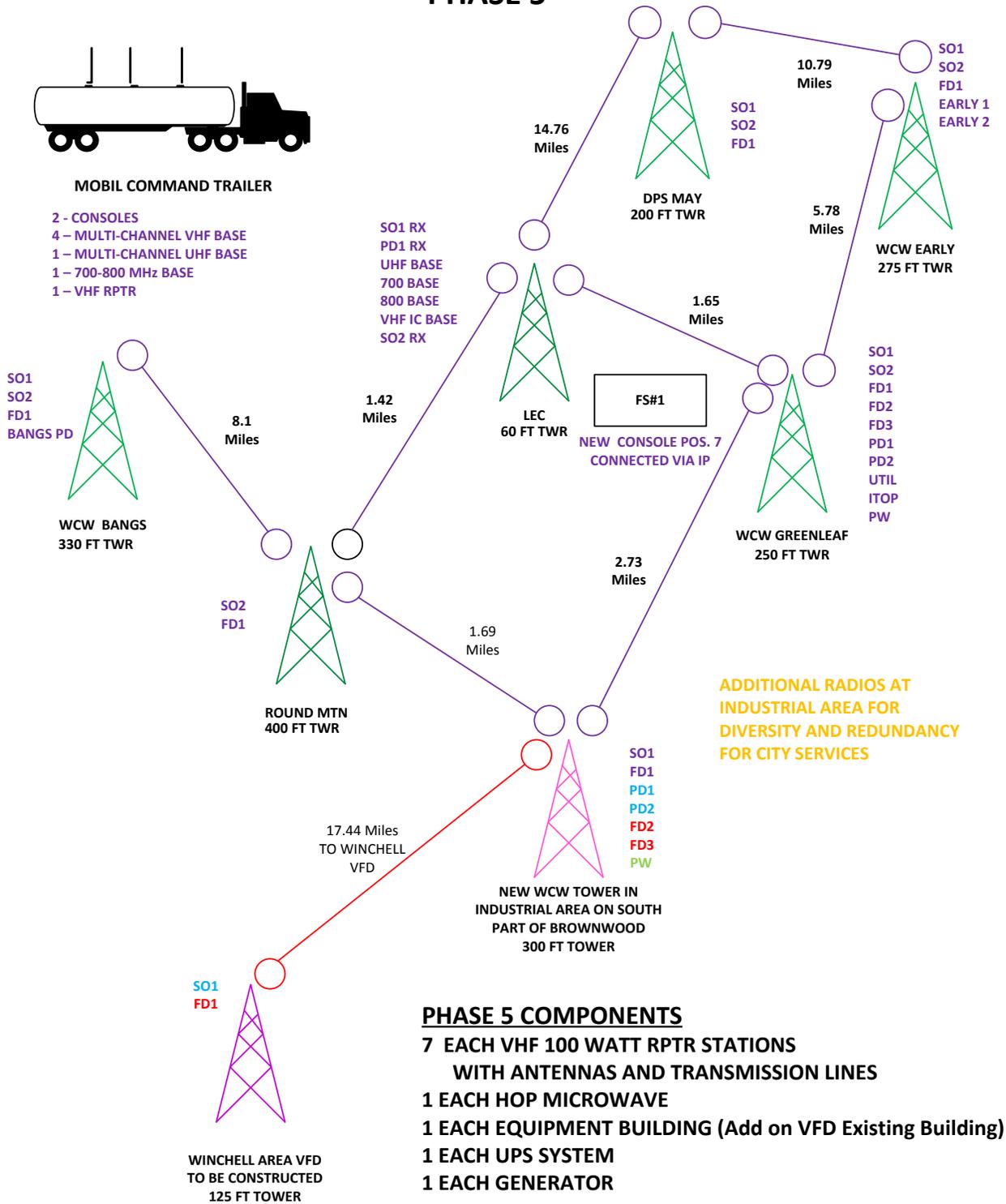
ROOM UPS

PHASE 5

New construction of 125 ft. tower at Winchell VFD (Brown County)

- Add microwave hop from WCW Industrial Area tower to WCW Winchell Area tower
- Add SO1 repeater at WCW Winchell Area tower
- Add FD1 repeater at WCW Winchell Area tower
- Add equipment building, generator, and UPS at WCW Winchell Area tower
- Add Diversity and redundancy radios at WCW Industrial Area for Brownwood City radios:
 - PD1
 - PD2
 - FD2
 - FD3
 - PW

BROWNWOOD TX CITY AND BROWN COUNTY RADIO SYSTEM TOPOLOGY PHASE 5



BROWN COUNTY / BROWNWOOD TEXAS COMBINED PUBLIC SAFETY DISPATCH SYSTEM

PHASE 5

IP RADIOS

MULTIPLE ANTENNAS



GENERATORS

ROOM UPS

ADDITIONAL NOTATIONS FOR CONSIDERATION

In addition to the radio console dispatch equipment and radios detailed in this RFP, the following items need to be upgraded or replaced as deemed necessary at the LEC dispatch center to fully utilize the potential of the newly installed systems:

DISPATCH EQUIPMENT

- Console Furniture
- Keyboards
- Computers and Other Components
- Monitors
- Microphones
- Head Sets
- Speakers
- Battery Backups
- Dispatcher Chairs

DISPATCH - COMMON (Back Room Electronics)

- Gateways
- Uninterruptable Power Supplies
- Air Conditioning
- Antennas
- Transmission Lines
- Lightening Protection
- Grounding
- Back-up Generators
- Electrical
- Lighting
- Cable Trays
- Racks
- Miscellaneous

PHYSICAL DISPATCH

- Flooring
- Electrical
- Lighting
- AC / Heat
- Walls
- Cable Runs
- Window Treatments

COMPLETED PROJECT SITE EQUIPMENT DETAIL

The following diagrams show the equipment configuration that is required upon the completion of this project for all system radios. Microwave equipment and requirements will be discussed following this section.

Long antennas will be 6 dB gain.

Short antennas will be unity gain or up to 3 dB gain.

All antennas will be tested prior to installation to verify specifications. Results will be recorded.

Tower top mounts for antennas will be as recommended by antenna manufacturer.

Tower side mounts for antennas will be three (3) foot standoff arm mount configuration.

All transmission lines will be 7/8 inch diameter.

All transmission lines will be swept prior to installation. Results will be recorded.

Transmission lines will have lightning protectors at the building interior where they enter the building.

Transmission lines will have grounding kits installed at the top, bottom of the vertical run before the transmission line leaves the tower and at the entrance to the building.

All antenna systems will be line swept following installation. Results will be recorded.

All existing antenna systems that are to be used in this project will be line swept to determine usability. Results will be recorded.

Any visible defects in antennas or mounts will be noted.

Telecom buildings (equipment shelters) as required will be of the "Fibrebond" type or configuration. Size of the building must be large enough to accommodate rack mounted equipment and other requirements for the site.

A concrete slab (leveled) is required for the building

The building will require heating and air conditioning sufficient to maintain interior temperature as required by the installed equipment.

The building will have a built-in transmission line portal.

The building will have adequate interior lighting and motion sensitive (LED) exterior lighting at the entrance.

Each building will require an UPS in the interior to provide a minimum of 3 hours run time for the installed equipment.

Each building will require an external propane fueled generator with automatic cut-in should power company electrical supply fail. Generator will be sized to supply minimum 5 day power requirements.

All equipment will be grounded to a common rack ground and rack grounds will be grounded to a common building ground.

Additional 110 volt common power outlets will be mounted in the interior of the building as required.

Alarm notification will be provided via IP to Dispatch if:

1. Incoming main power is interrupted
2. The UPS is engaged or fails
- 3 The generator is engaged or fails
4. Radio Failure
5. Equipment room temperature too high - A/C failure

SNMP alarm server required in Dispatch.

Fencing will be installed as necessary.

All radios and associated equipment will be rack mounted.

All radios with GPS are Simulcast TX and Voting RX.

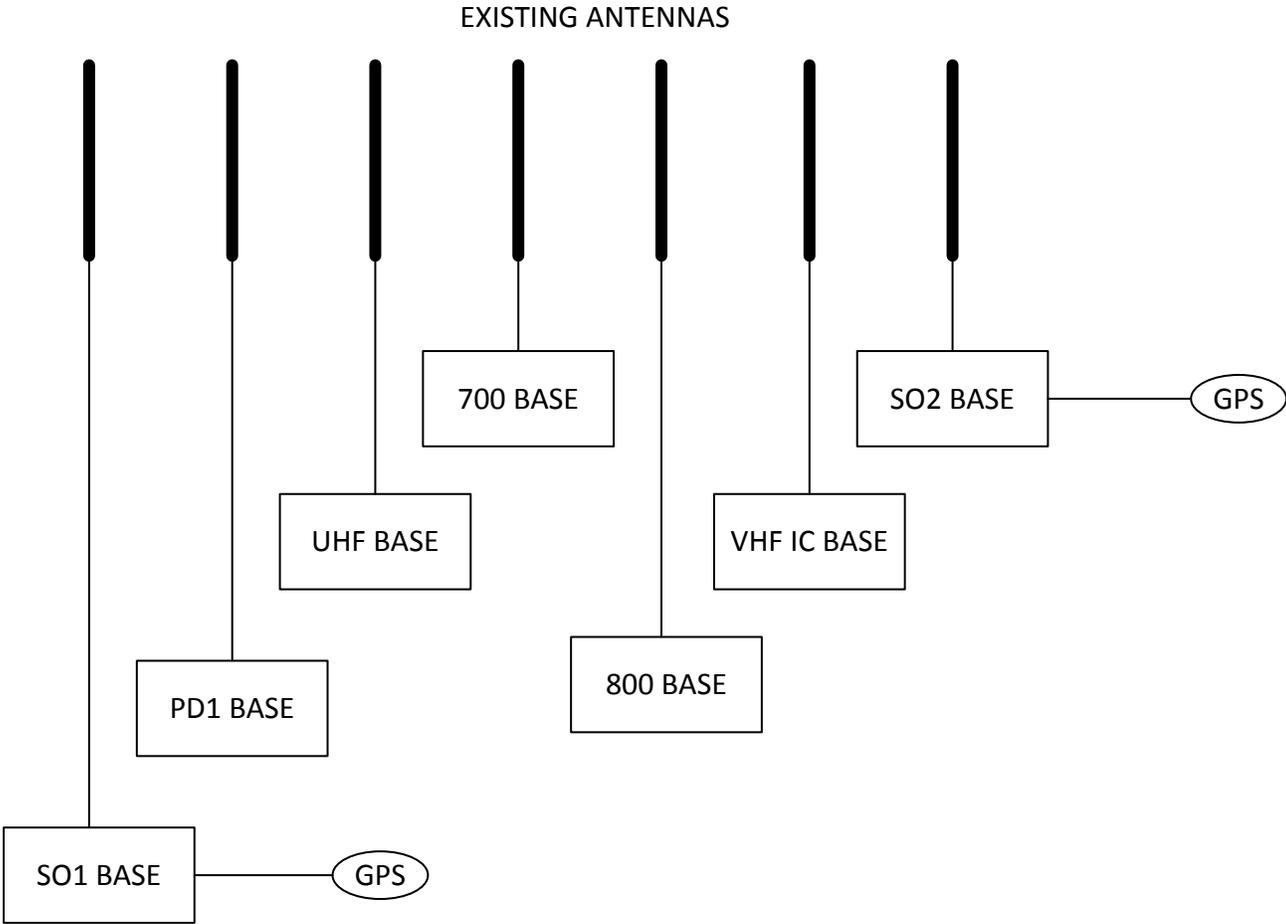
All TX Combiners are Hybrid Combiners.

Duplexers must be BpBr type duplexers.

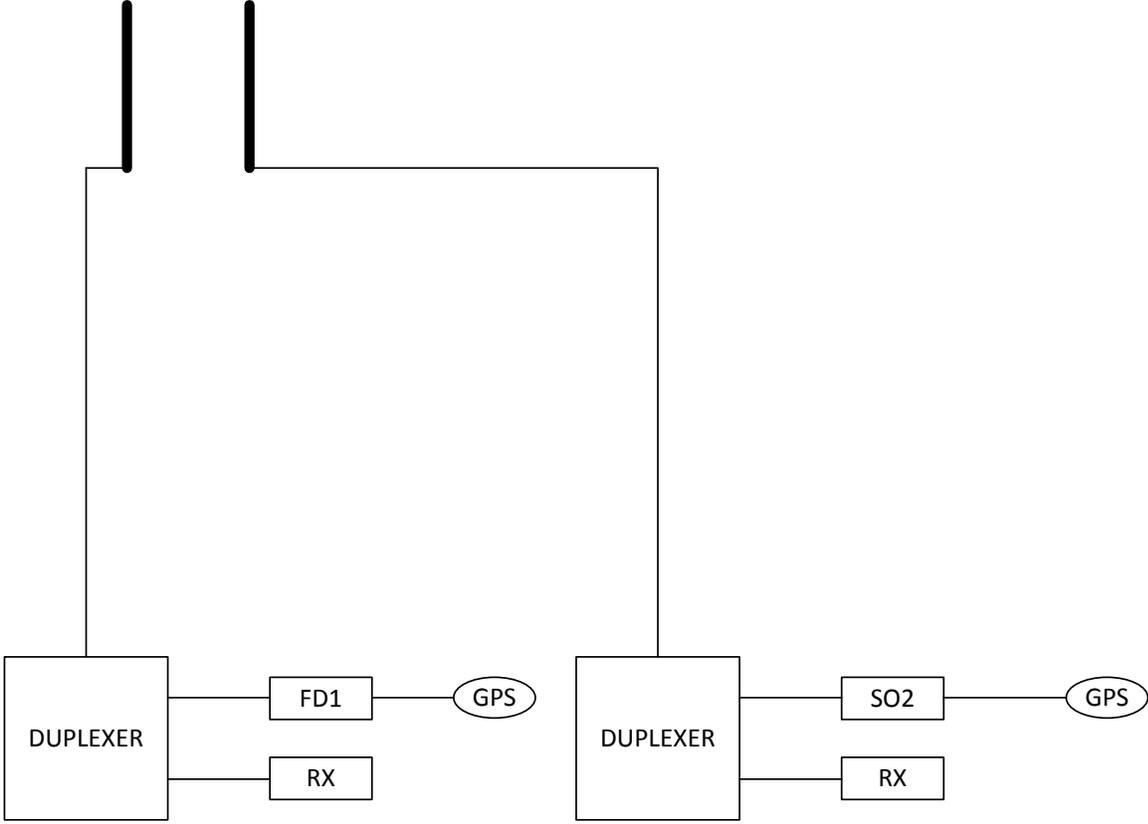
Interior connector cables must be PIM resistant.

BROWN COUNTY RADIO SITE DETAIL DRAWING

LEC TOWER AND ROOFTOP

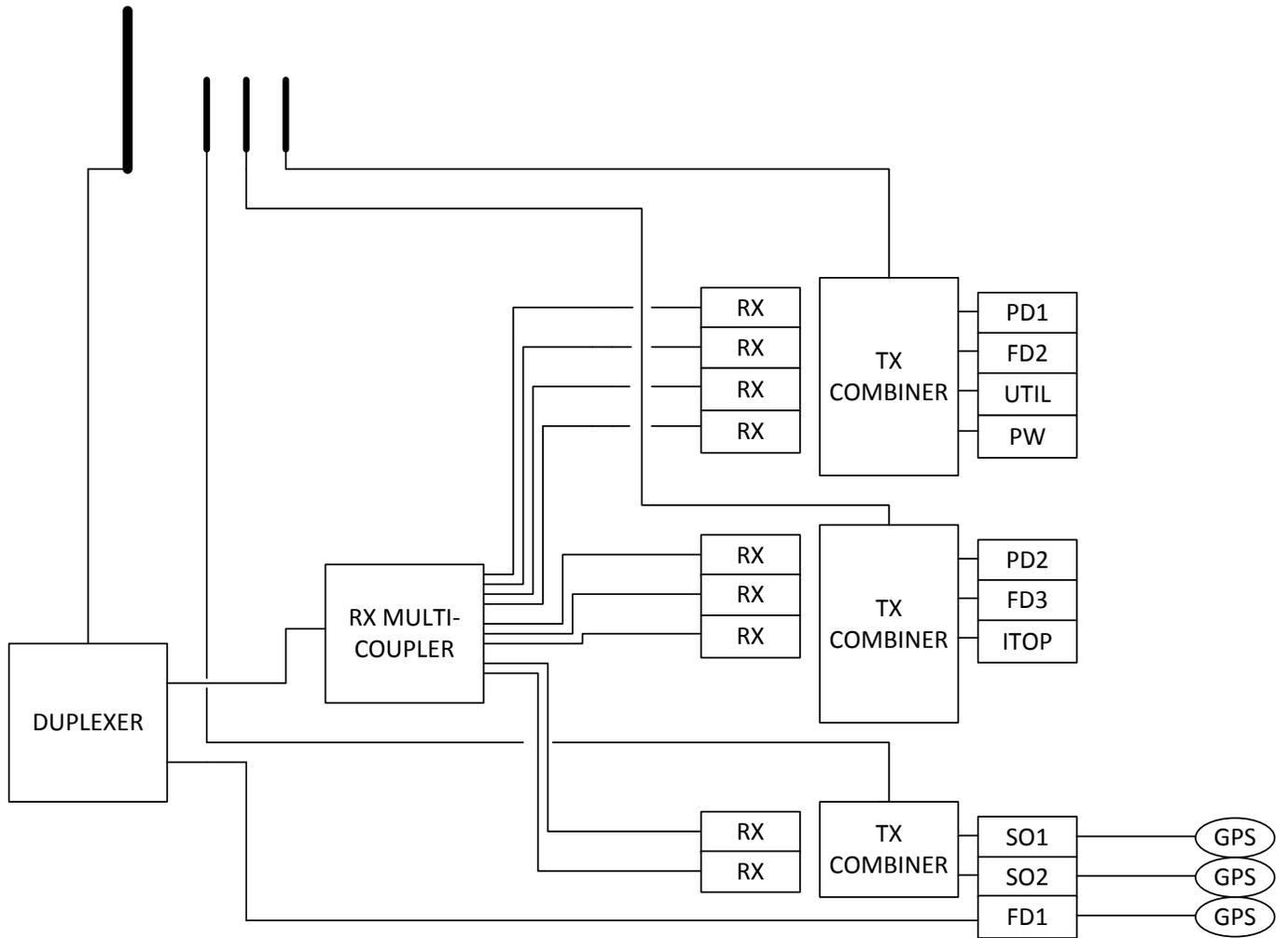


BROWN COUNTY RADIO SITE DETAIL DRAWING
ROUND MOUNTAIN



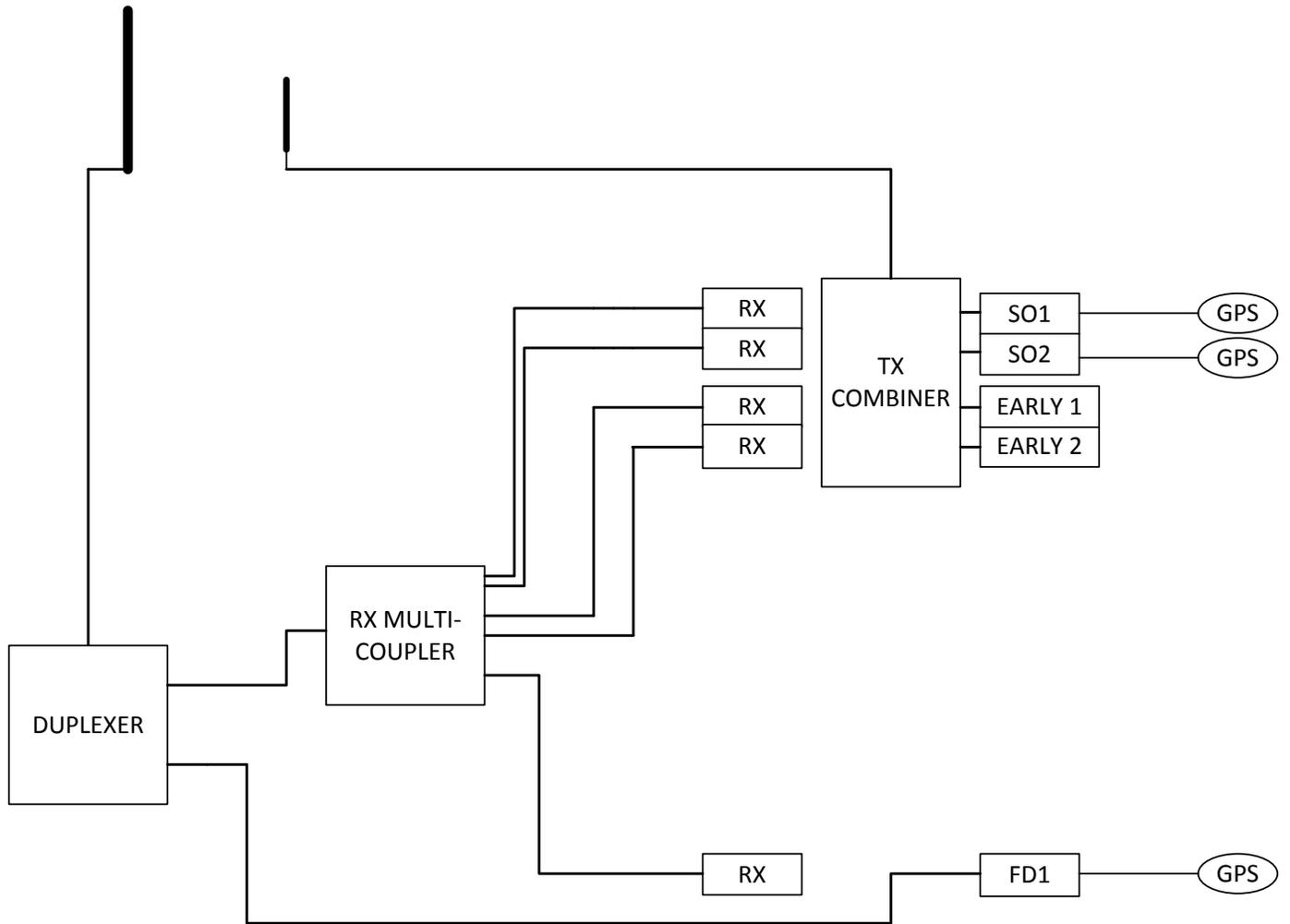
BROWN COUNTY RADIO SITE DETAIL DRAWING

WCW GREENLEAF



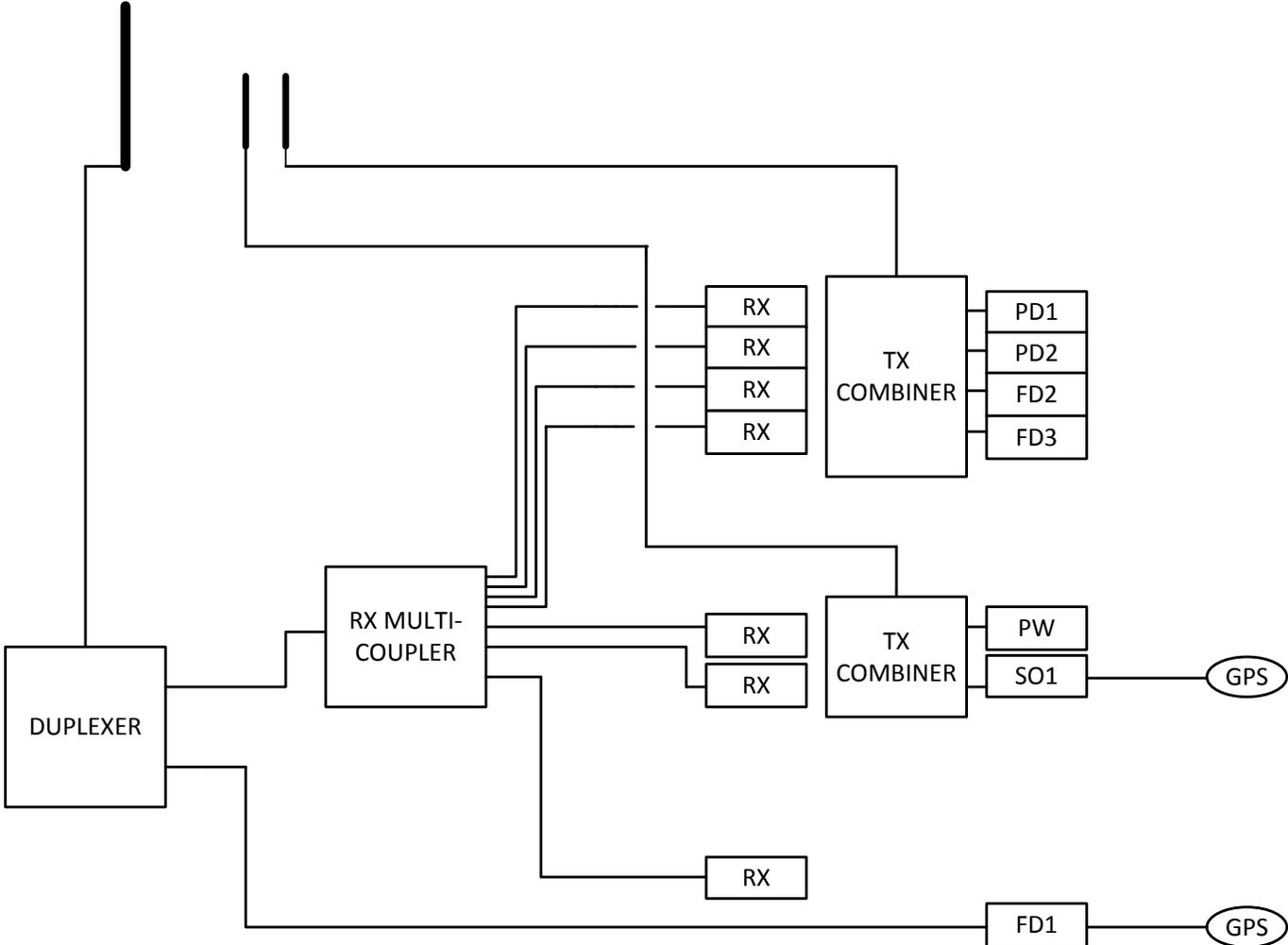
BROWN COUNTY RADIO SITE DETAIL DRAWING

WCW EARLY



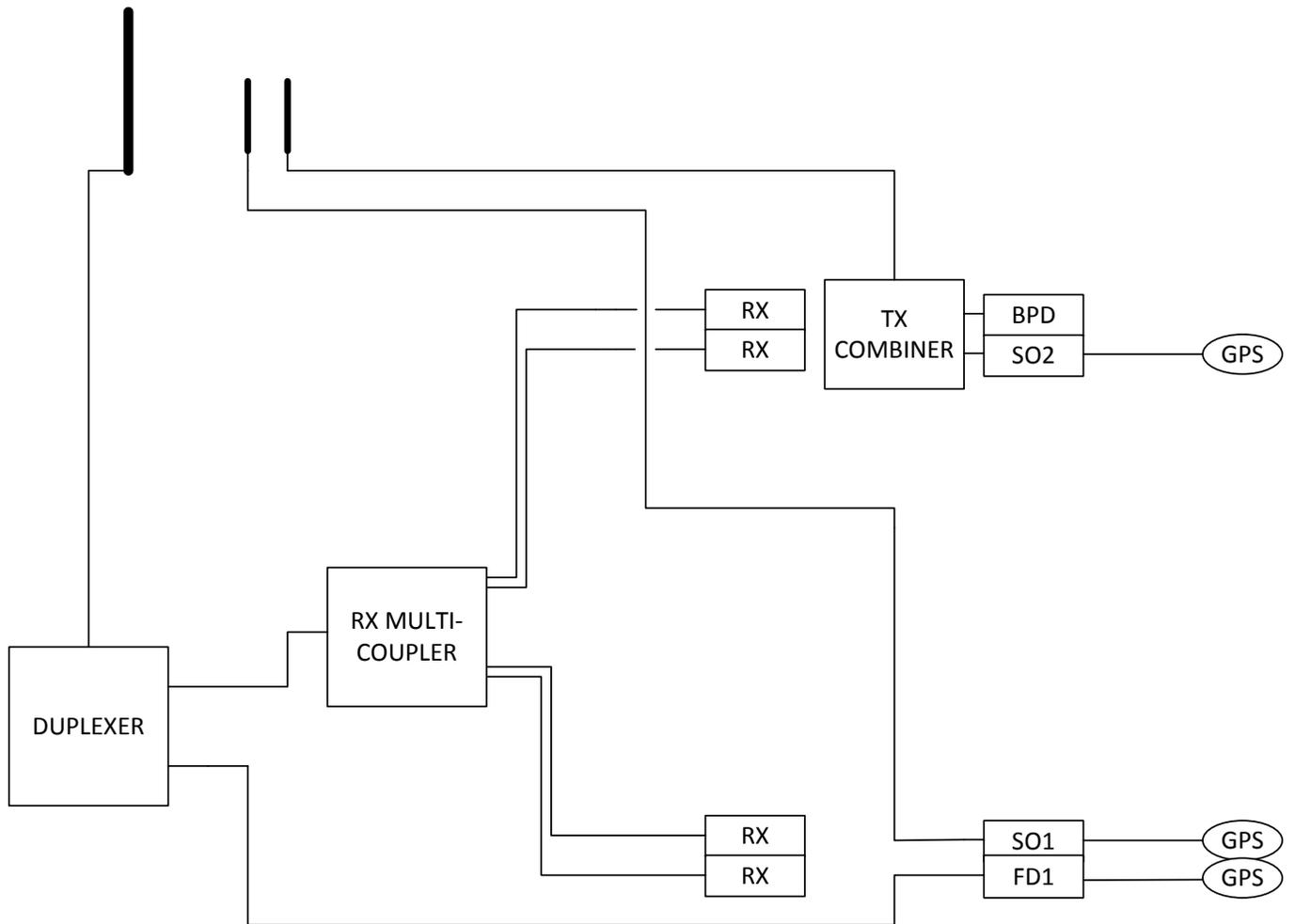
BROWN COUNTY RADIO SITE DETAIL DRAWING

WCW INDUSTRIAL



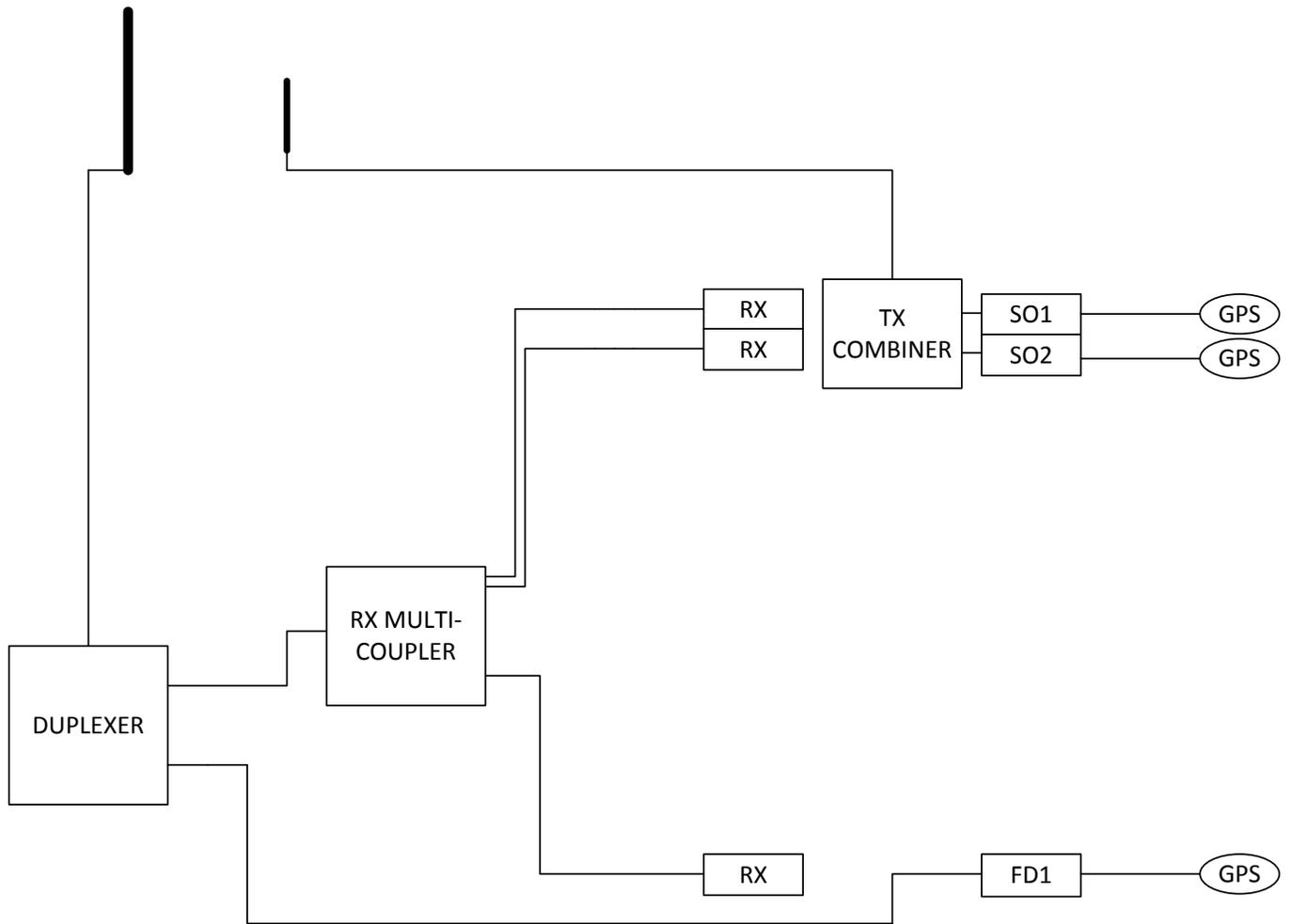
BROWN COUNTY RADIO SITE DETAIL DRAWING

WCW BANGS



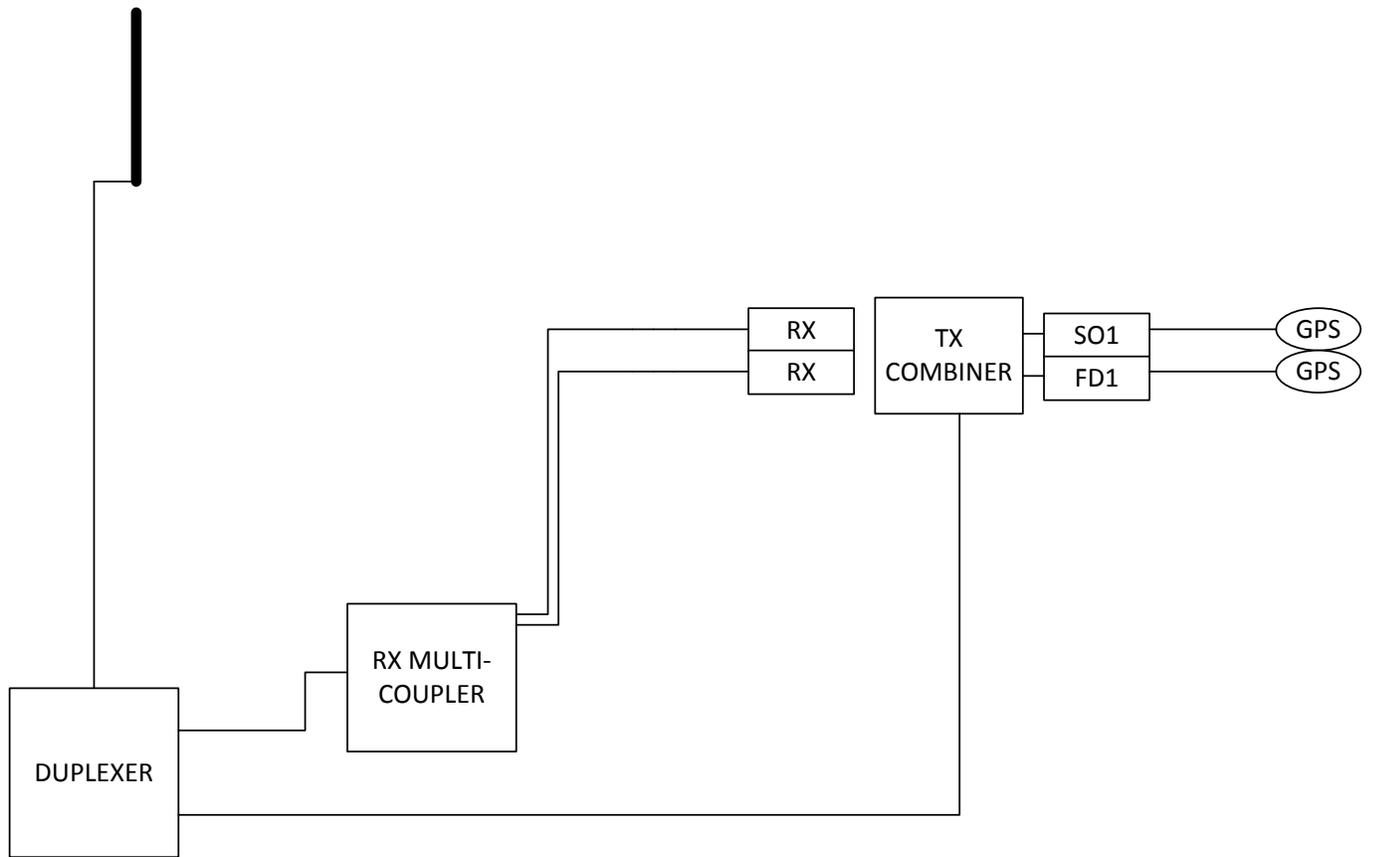
BROWN COUNTY RADIO SITE DETAIL DRAWING

DPS MAY



BROWN COUNTY RADIO SITE DETAIL DRAWING

WINCHELL AREA



MICROWAVE CONNECTIVITY

Upon completion of this project, microwave connectivity for all 11 sites will be established.

Each microwave hop will require 2 Cambium High Gain antennas of the following specifications.

Cambium PTP 670

Frequency	4.9 GHz
Gain	27 dBm
Dimensions	8 in. X 12.5 in. X 3.5 in.
Weight	6.8 lbs.
30 watt maximum power consumption	
+ mounting hardware	

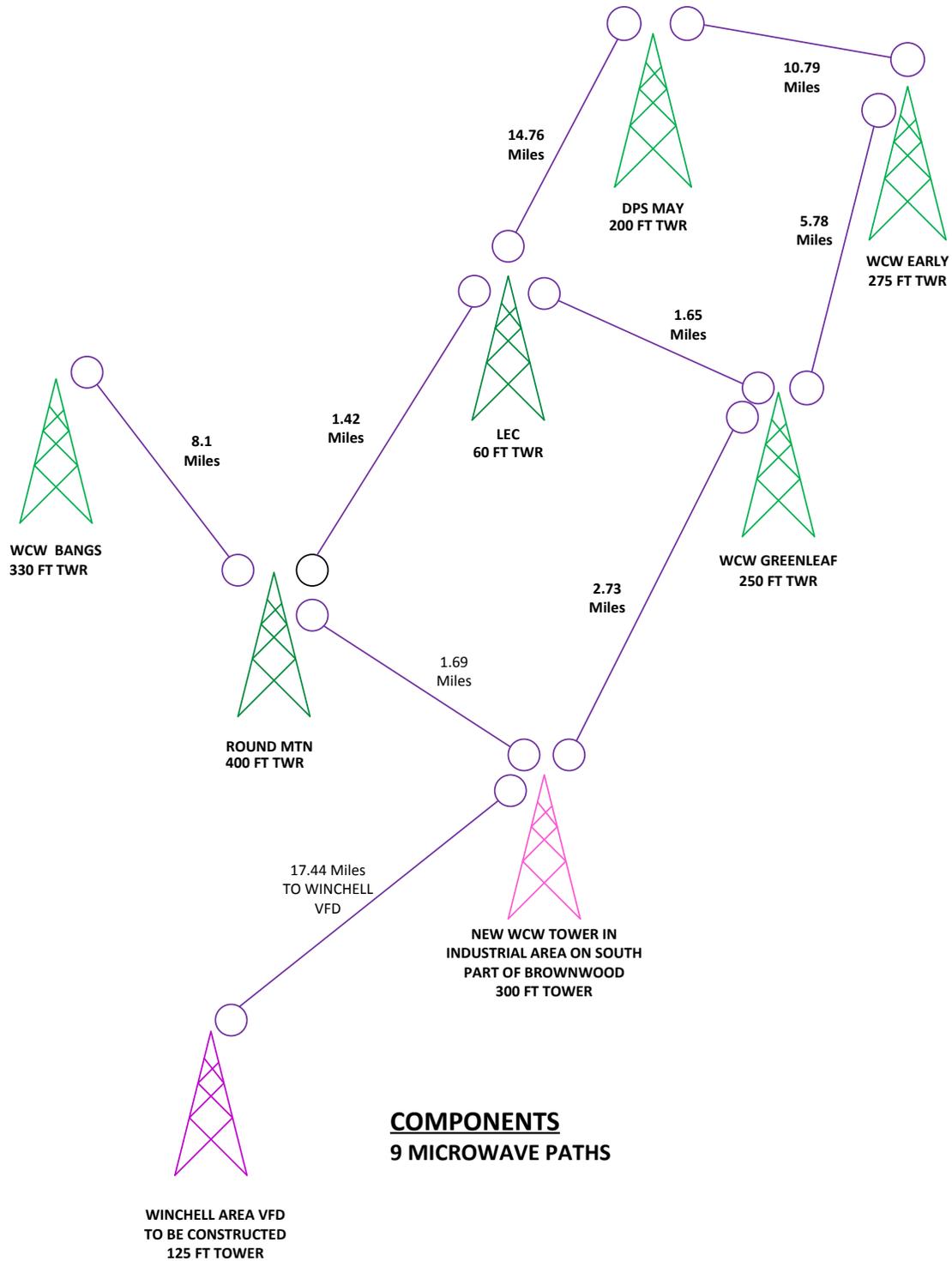
Routers will be rack mounted

LEC	Number of Ports to be Determined
Greenleaf	Number of Ports to be Determined
WCW Industrial	Number of Ports to be Determined
WCW Early	Number of Ports to be Determined
WCW Bangs	Number of Ports to be Determined
DPS May	Number of Ports to be Determined
Round Mountain	Number of Ports to be Determined
Winchell	Number of Ports to be Determined
Brownwood FS1	Number of Ports to be Determined
Brownwood CH	Number of Ports to be Determined
Early CH	Number of Ports to be Determined

Cabling will be Shielded CAT 5 E.

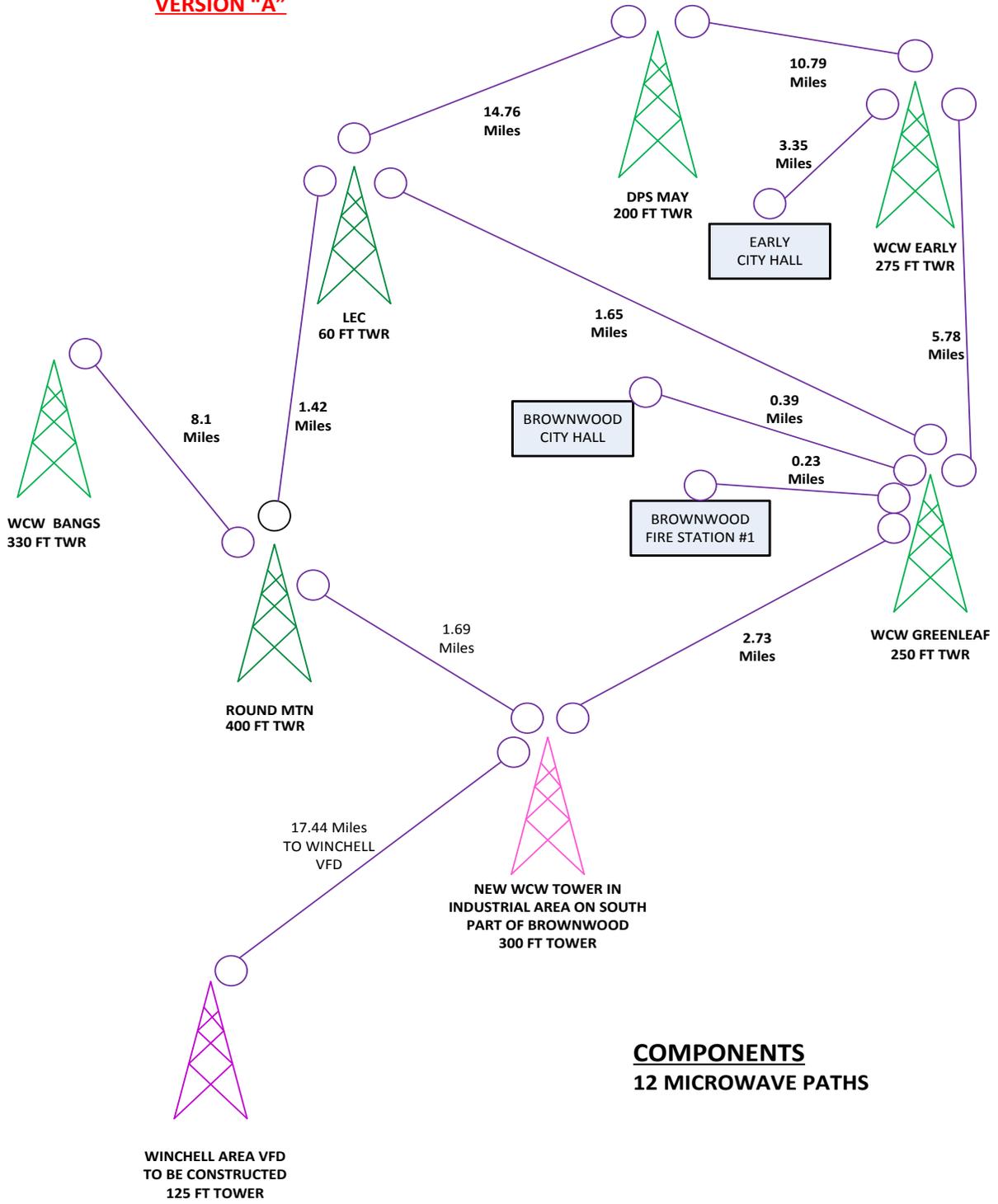
Appropriate lightning protection will be installed on each cable run.

BROWNWOOD TX CITY AND BROWN COUNTY MICROWAVE CONNECTIVITY



BROWNWOOD TX CITY AND BROWN COUNTY MICROWAVE CONNECTIVITY

VERSION "A"



COMPONENTS
12 MICROWAVE PATHS

BROWNWOOD TX CITY AND BROWN COUNTY

SITE LISTING

ROUND MOUNTAIN

ASR = 1063741

FRN = 0014465546

Latitude = 31 – 42 – 16.6 N Longitude = 099 – 00 – 06.1 W NAD83

Ground Elevation (AMSL) = 444.7 m 1459 ft

Overall Height above Ground (AGL) = 127.9 m 420 ft

Overall Height (AMSL) = 572.6 m 1879 ft

TEXAS DPS – MAY, TX

ASR = 1220104

FRN = 0001672419

Latitude = 31 - 55 - 12.5 N Longitude = 098 - 54 - 00.1 W ASR

Latitude = 31 - 55 - 12.5 N Longitude = 098 - 54 - 00.2 W FCC

Latitude = 31 - 55 - 11.49 N Longitude = 098 - 53 - 58.25 W Google

Ground Elevation (AMSL) = 600.0 m 1968 ft

Overall Height above Ground (AGL) = 61.0 m 200 ft

Overall Height (AMSL) = 661.0 m 2168 ft

BROWNWOOD LEC (TOWER)

Latitude = 31 - 43 - 30.54 N Longitude = 99 - 00 - 15.64 W Google

Ground Elevation (AMSL) = 420 m 1378 ft

Existing Tower = 18 m 60 ft

WCW - GREENLEAF - LATTICE TOWER

ASR = 1278720

FRN = 0001650860

Latitude = 31 - 43 - 10.6 N	Longitude = 098 - 58 - 38.1 W	ASR
Ground Elevation (AMSL)	= 406.6 m	1334 ft
Overall Height above Ground (AGL)	= 76.2 m	250 ft
Overall Height (AMSL)	= 482.8 m	1584 ft

WCW - BANGS, TEXAS - GUYED TOWER

1496 County Road 138, Bangs, TX 76823

ASR = 1297654

Latitude = 31 - 43 - 38.1 N	Longitude = 099 - 08 - 10.1 W	ASR
Latitude = 31 - 43 - 37.23 N	Longitude = 099 - 08 - 9.01 W	Google
	(ASR Location Off 128 ft)	

Ground Elevation (AMSL)	= 499.6 m	1639 ft
Overall Height above Ground (AGL)	= 100.6 m	330 ft
Overall Height (AMSL)	= 600.2 m	1969 ft

WCW - EARLY, TEXAS - LATTICE TOWER

0.7 miles E on Hwy 377

ASR = 1048657

FRN = 0001665751

Latitude = 31 - 45 - 49.0 N	Longitude = 098 - 53 - 35.0 W	ASR
Ground Elevation (AMSL)	= 466.3 m	1530 ft
Overall Height above Ground (AGL)	= 83.8 m	275 ft
Overall Height (AMSL)	= 550.1 m	1805 ft

WCW - BROWNWOOD INDUSTRIAL - GUYED TOWER - To Be Constructed

Latitude = 31 – 40 – 54.90 N	Longitude = 98 – 59 – 27.60 W	Google
Ground Elevation (AMSL)	= 426.7 m 1400 ft	
Proposed New Tower	= 91.4 m 300 ft	

WINCHELL VFD - To Be Constructed

Latitude = 31 – 28 – 25.33 N	Longitude = 99 – 9 – 36.52 W	Google
Ground Elevation (AMSL)	= 408 m 1340 ft	
Proposed New Tower	= 55 m 125 ft	

BROWNWOOD CITY HALL

Latitude = 31 – 43 – 11.10 N	Longitude = 98 – 59 – 00.79 W	Google
Roof Top Elevation (AMSL)	= 410 m 1346 ft	

BROWNWOOD FIRE STATION #1

Latitude = 31 – 43 – 01.64 N	Longitude = 98 – 58 – 47.54 W	Google
Roof Top Elevation (AMSL)	= ?	

EARLY CITY HALL

Latitude = 31 – 44 – 35.28 N	Longitude = 98 – 56 – 42.80 W	Google
Ground Elevation (AMSL)	= 434 m 1423 ft	