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**Nokia UltraSite EDGE BTS, Rel. CX5, Product
Documentation, v.1**

Configuration and Combining Options for UltraSite EDGE BTS



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1

Summary of changes in Configuration and Combining Options for UltraSite EDGE BTS

The following changes have taken place in the *Configuration and Combining Options for UltraSite EDGE BTS* document:

- Section *Configurations for UltraSite EDGE BTS Mini Outdoor* including Mini Outdoor information added.

2

Overview of configuration and combining options in UltraSite EDGE BTS



Note

The cable routing illustrated in the figures is for reference only. The installer determines routing during installation.

For UltraSite EDGE BTS Mini Outdoor configurations, see *Configurations for UltraSite EDGE BTS Mini Outdoor*.

Combining options

The BTS supports various combining options. You can configure the BTS in the following ways:

- Combining Bypass - No signal combining is used.
- Wideband Combining (WBC)
 - 2-Way WBC - Signals from two TSxx units are combined into one antenna using one WCxA unit or one block (A, B, or C) of WCxT unit.
 - 4-Way WBC - Signals from four TSxx units are combined into one antenna using two parallel WCxA units in series and a single WCxA unit or three blocks (A, B, and C) of WCxT unit.
- Remote Tune Combining (RTC)
 - Signals from six TSxx units are combined into one antenna with one RTxx unit.
 - Signals from twelve TSxx units are combined into two antennas (a separate antenna for RX diversity is unnecessary). Two RTxx units are needed.

- Dual Band Combining (GSM 800/1900 or 900/1800 in the same cabinet)
 - Use any WBC or RTC combining option within each band.
 - DU2x combines RX/TX signals into one antenna (optional).
- Horizontal Sectoring (combining signals from different cabinets)
 - Use any WBC or RTC combining option.

Cabinet configurations

To accomplish these combining options, the BTS supports various cabinet configurations.

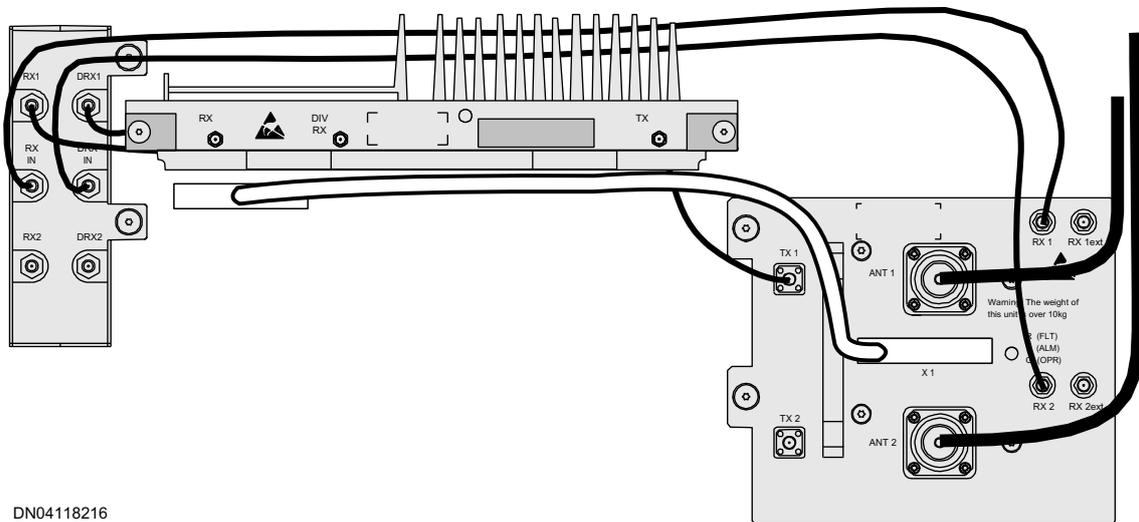
Various cabinet combining configurations include, for example:

- 1+1+1, DVxx, Combining bypass
- 2+2+2, DVxx, Combining bypass
- 2-way WBC, 2-TSxx sector
- 2-way WBC, 4-TSxx sector
- 2-way WBC, 6-TSxx sector
- 2+2+2, DVxx, 2-way WBC
- 6+6+6, DVxx, 2-way WBC
- 4-way WBC, 4-TSxx sector
- 4-way WBC, 8-TSxx sector
- 4-way WBC, 12-TSxx sector
- 12+12+12, DVxx, 4-way WBC
- RTC, 6-TSxx sector
- 6+6+6, RTC
- 6 Omni, RTC
- RTC, 12-TSxx sector
- 12+12+12, RTC
- 6+6+6, 2+2+2, Dual Band Combining without diversity
- 6+6+6, 2+2+2, Dual Band Combining with diversity
- 8+8+8, 4+4+4, Dual Band Combining

- 8+8+8, Horizontal sectoring, WBC
- 8+8+8, Horizontal sectoring, RTC

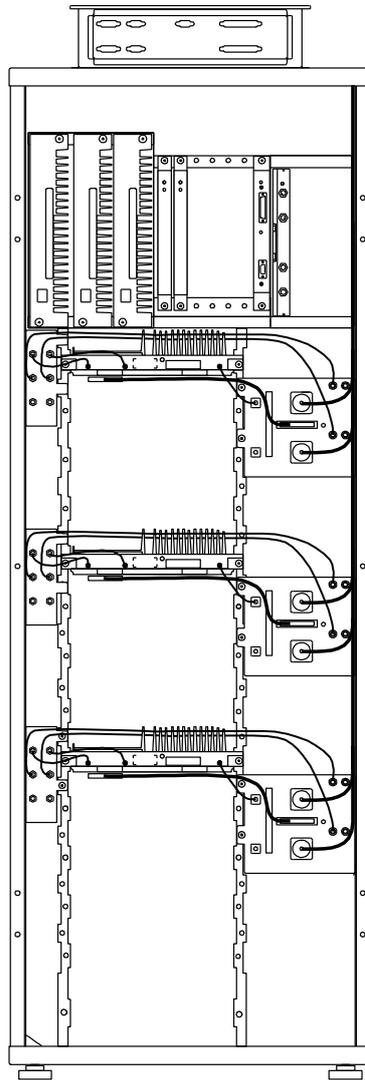
3 Configurations for UltraSite EDGE BTS

3.1 Combining bypass options



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Figure 1. RF cabling for 1+1+1 bypass configuration



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Figure 2. 1+1+1, DVxx, Combining bypass

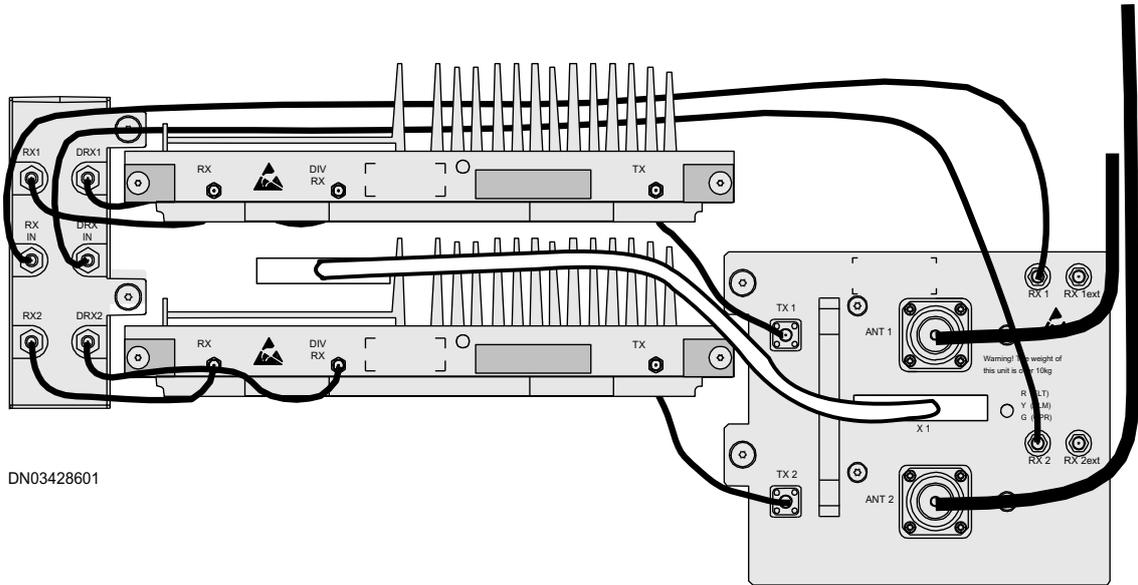
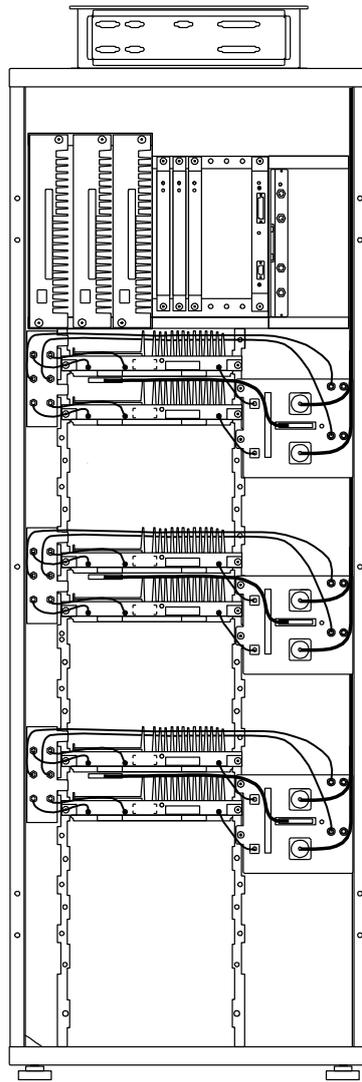


Figure 3. RF cabling for 2+2+2 bypass configuration



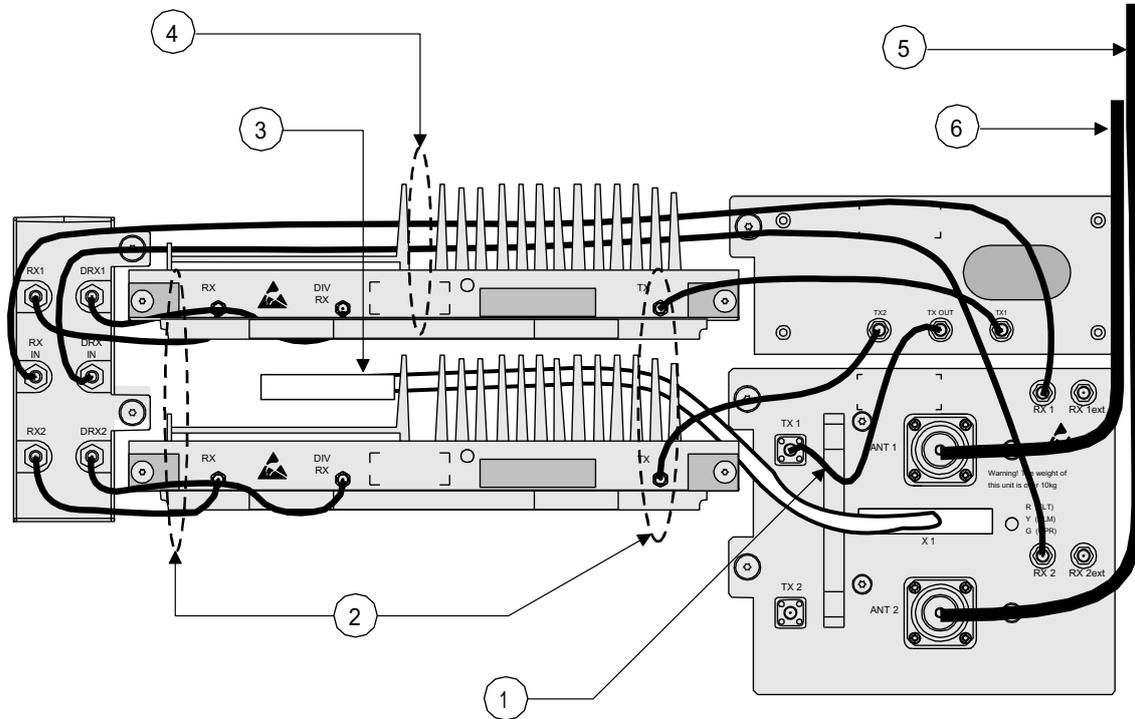
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Figure 4. 2+2+2, DVxx, Combining bypass

3.2 2-way Wideband combining options

With 2-way Wideband Combining (WBC), the WCxA unit combines the transmit (TX) signals from two Transceiver (TSxx) units and feeds the combined signal to the antenna through the TX port of the Dual Variable Gain Duplex Filter (DVxx) unit.

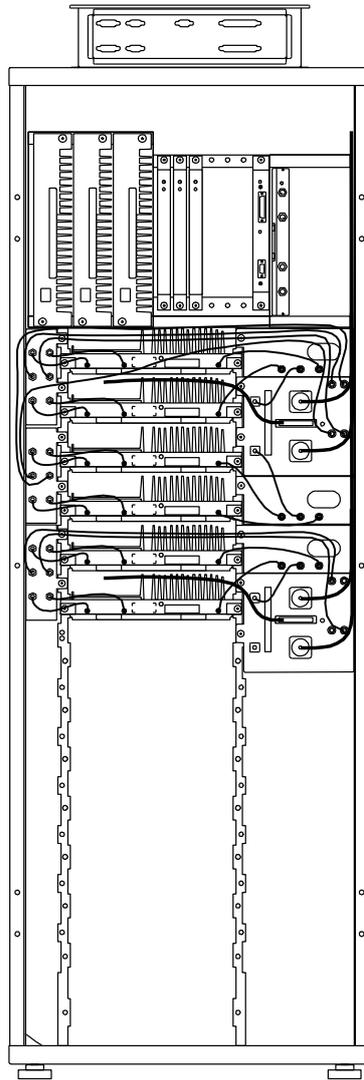
A sector can have 2-way WBC and 2-way diversity with 2, 4, or 6 TSxx unit sectors.



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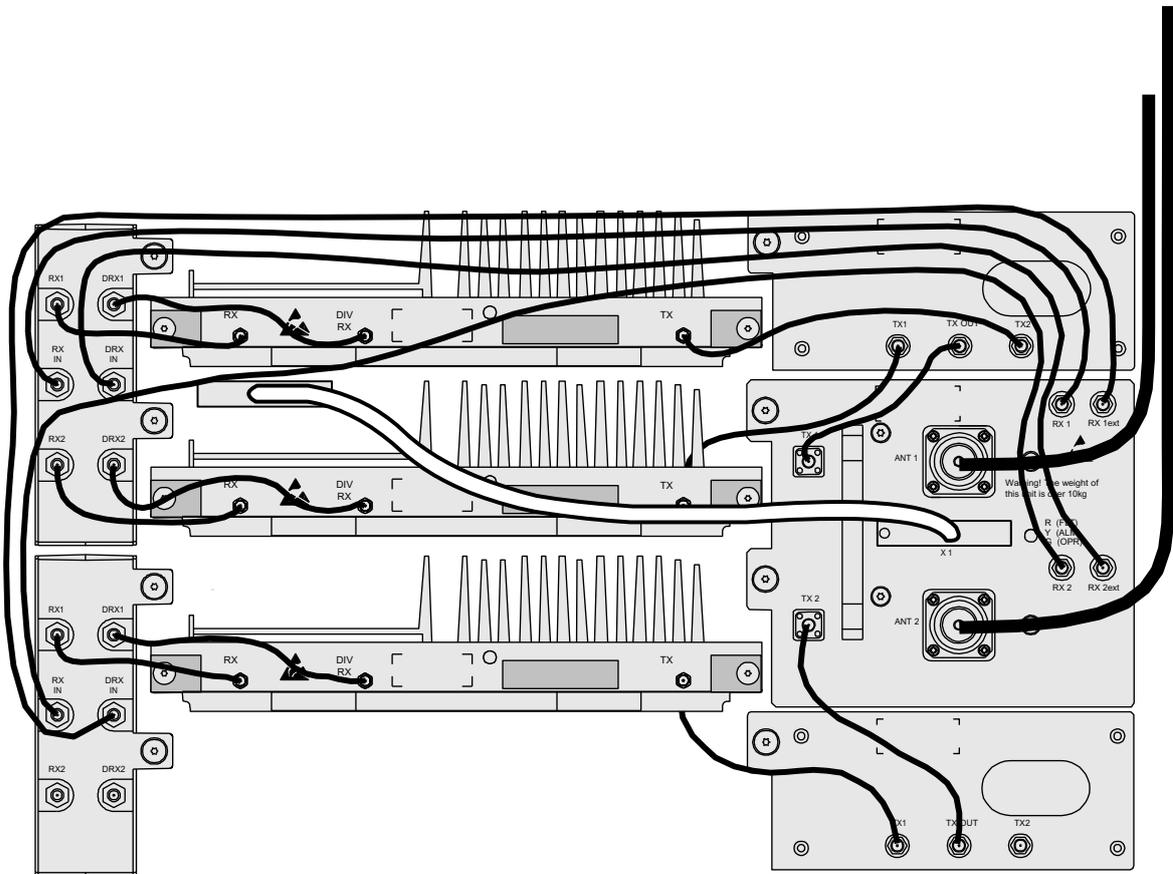
1	#993747x
2	#993857x (six places)
3	DVxx to RFU backplane #993997x
4	#994081x (two places)
5	Antenna 2: Diversity RX
6	Antenna 1: TX/RX

Figure 5. 2+2+2 two-way WBC



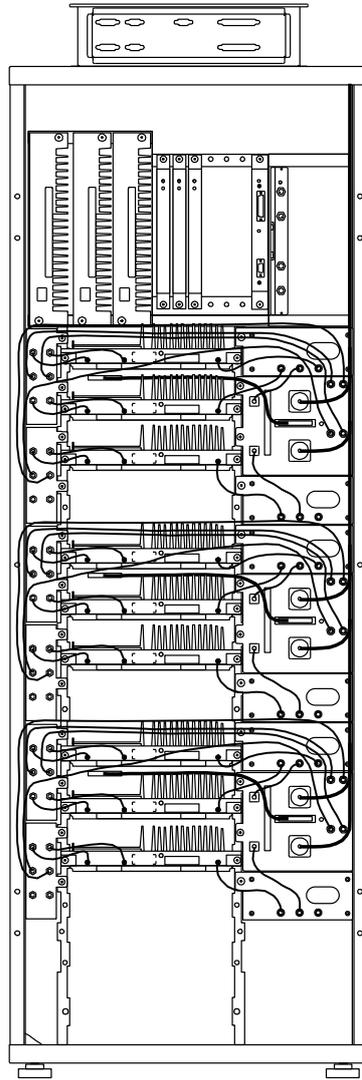
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Figure 6. 2+2+2 two-way WBC



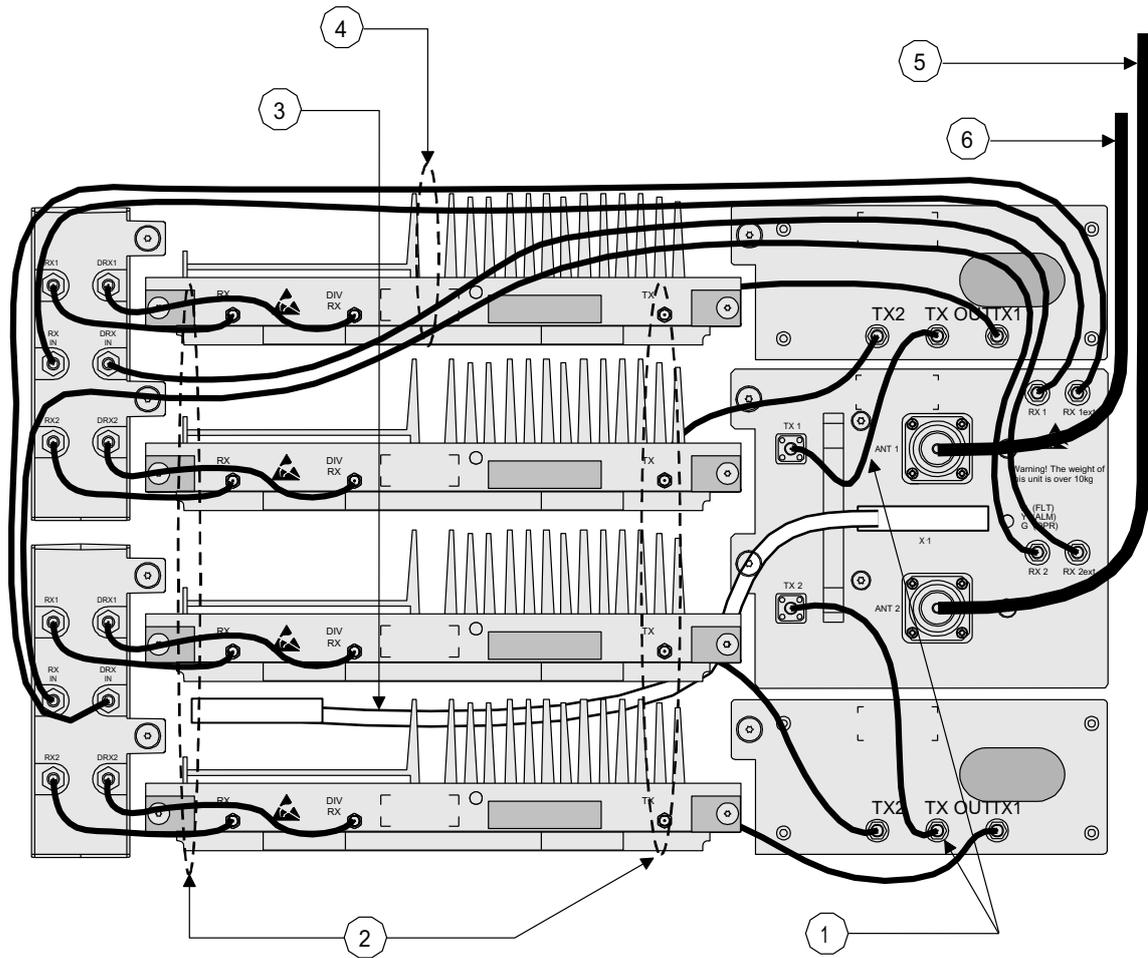
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Figure 7. 3+3+3 two-way WBC



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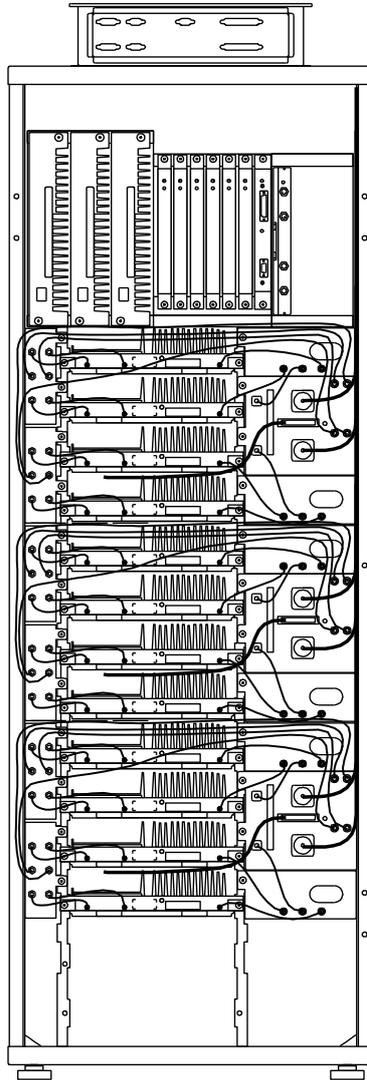
Figure 8. 3+3+3 two-way WBC



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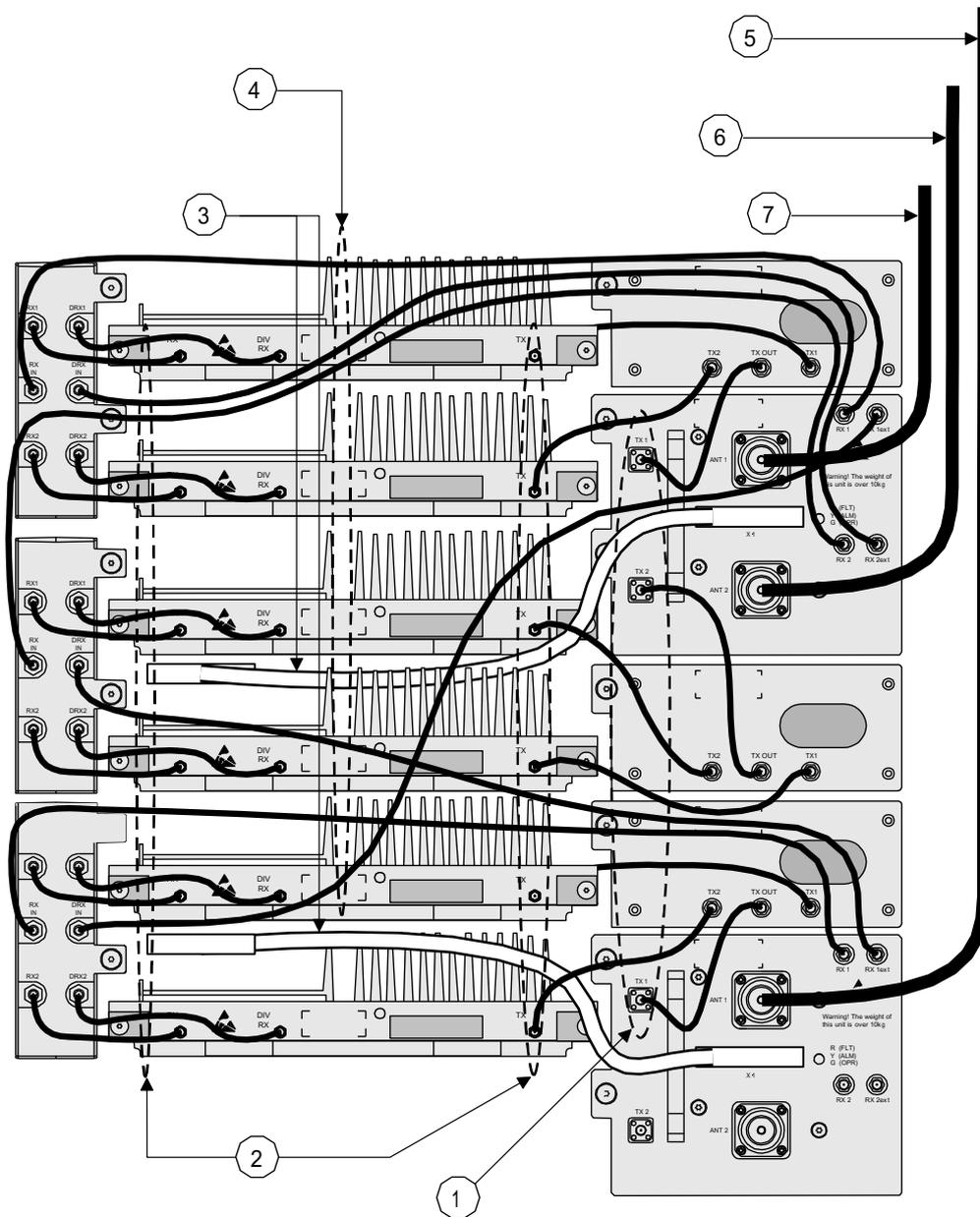
1	#993747x (two places)
2	#993857x (twelve places)
3	DVxx to RFU backplane #993997x
4	#994081x (four places)
5	Antenna 2: TX/RX 2, Diversity RX 1
6	Antenna 1: TX/RX 1, Diversity RX 2

Figure 9. 4+4+4 two-way WBC



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Figure 10. 4+4+4 two-way WBC

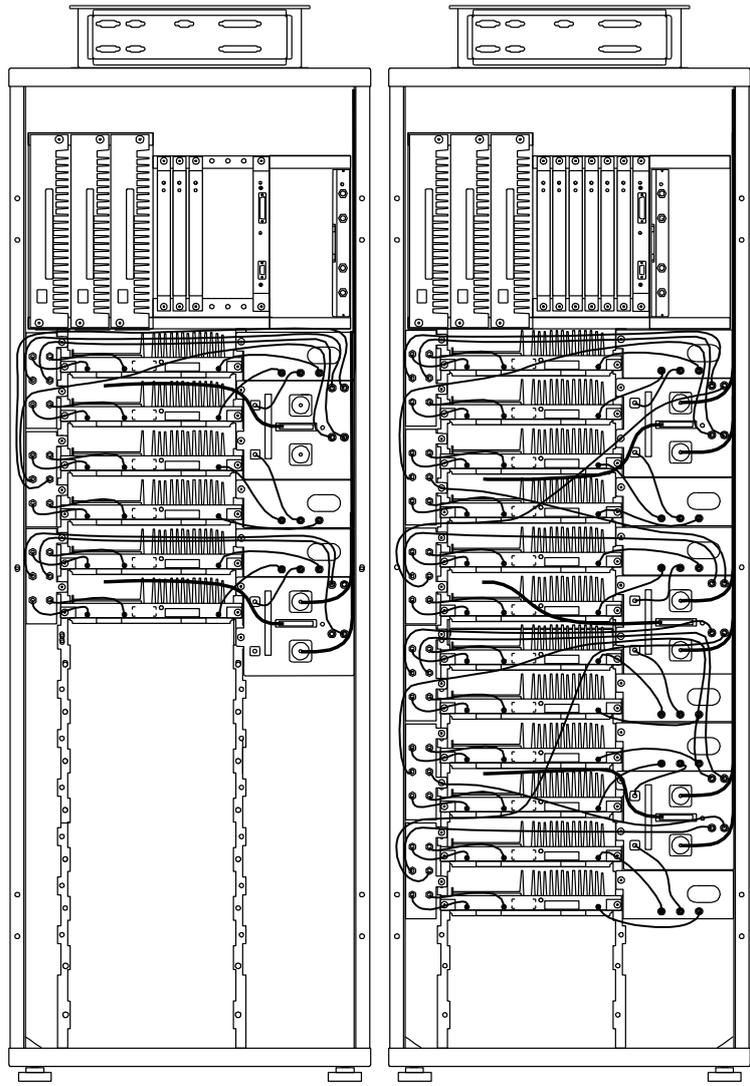


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1	#993747x (three places)
2	#993857x (twelve places)
3	DVxx to RFU backplane #993997x
4	#994081x (six places)
5	Antenna 3: TX/RX 3, Diversity RX 2

6	Antenna 2: TX/RX 2, Diversity RX 1
7	Antenna 1: TX/RX 1, Diversity RX 3

Figure 11. 6+6+6 two-way WBC



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Figure 12. 6+6+6 two-way WBC

3.3 2-way Wideband combining options for the Triple Wideband Combiner (WCxT) unit

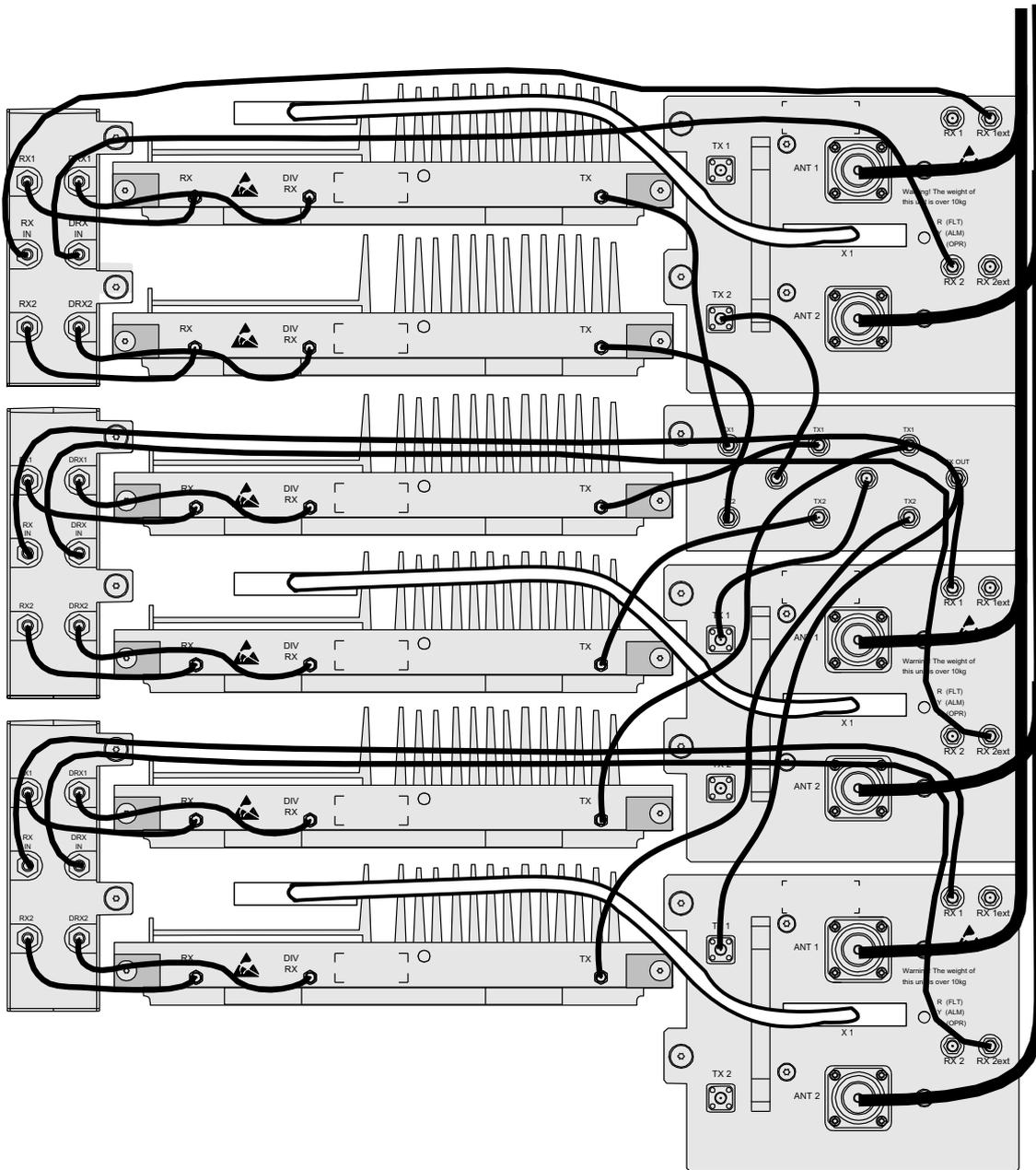
With 2-way Wideband Combining (WBC), one block (A, B, or C) of the WCxT unit combines the transmit (TX) signals from two Transceiver (TSxx) units and feeds the combined signal to the antenna through the TX port of the Dual Variable Gain Duplex Filter (DVxx) unit.

A sector can have 2-way WBC and 2-way diversity with 2, 4, or 6 TSxx unit sectors.



Note

When cabling, start with the short cables and distances.

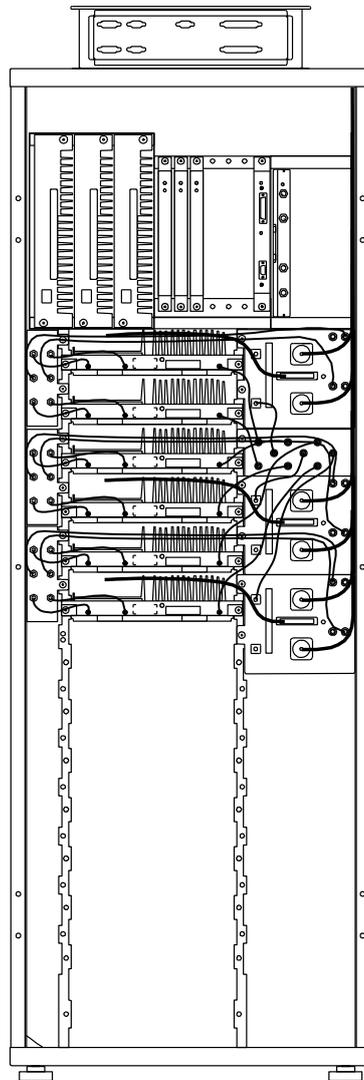


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Figure 13. 2-way WBC, 2 - TSxx sector

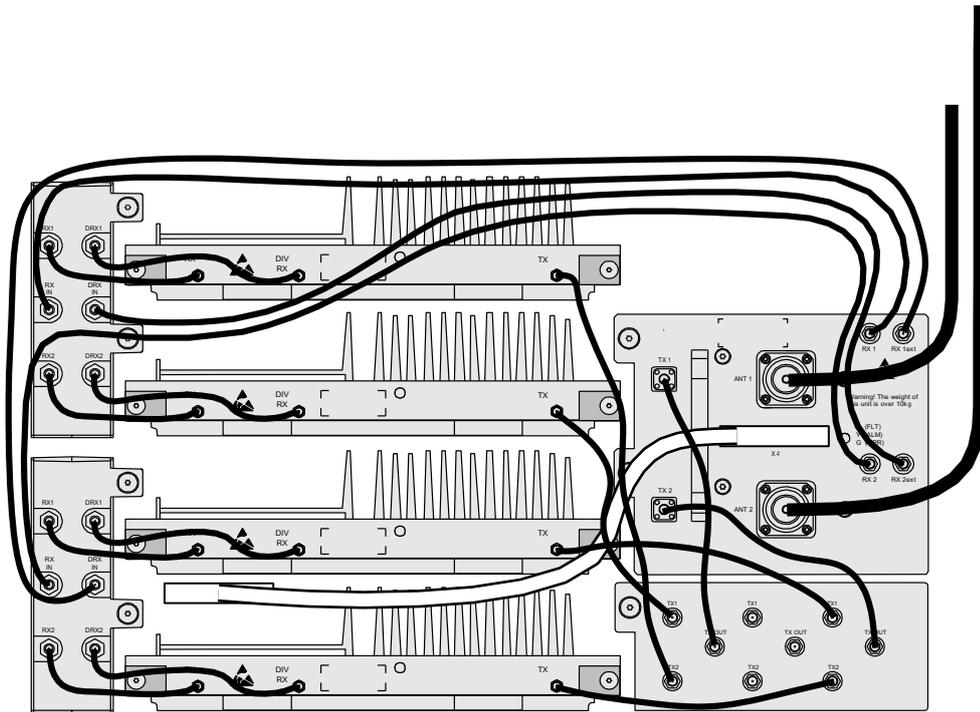
 Note

Sector 1 (TRX 1 to 6) is connected as Figure .2-way WBC, 2 - TSxx sector.



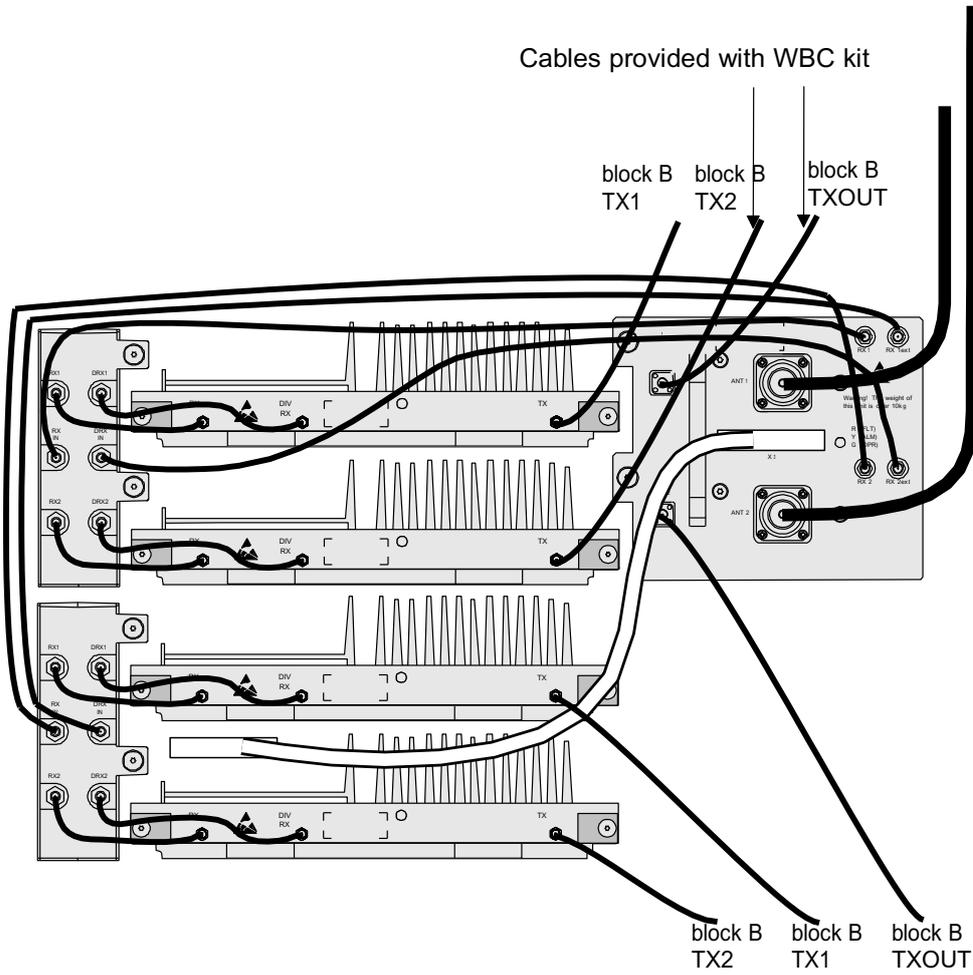
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Figure 14. 2+2+2 two-way WBC



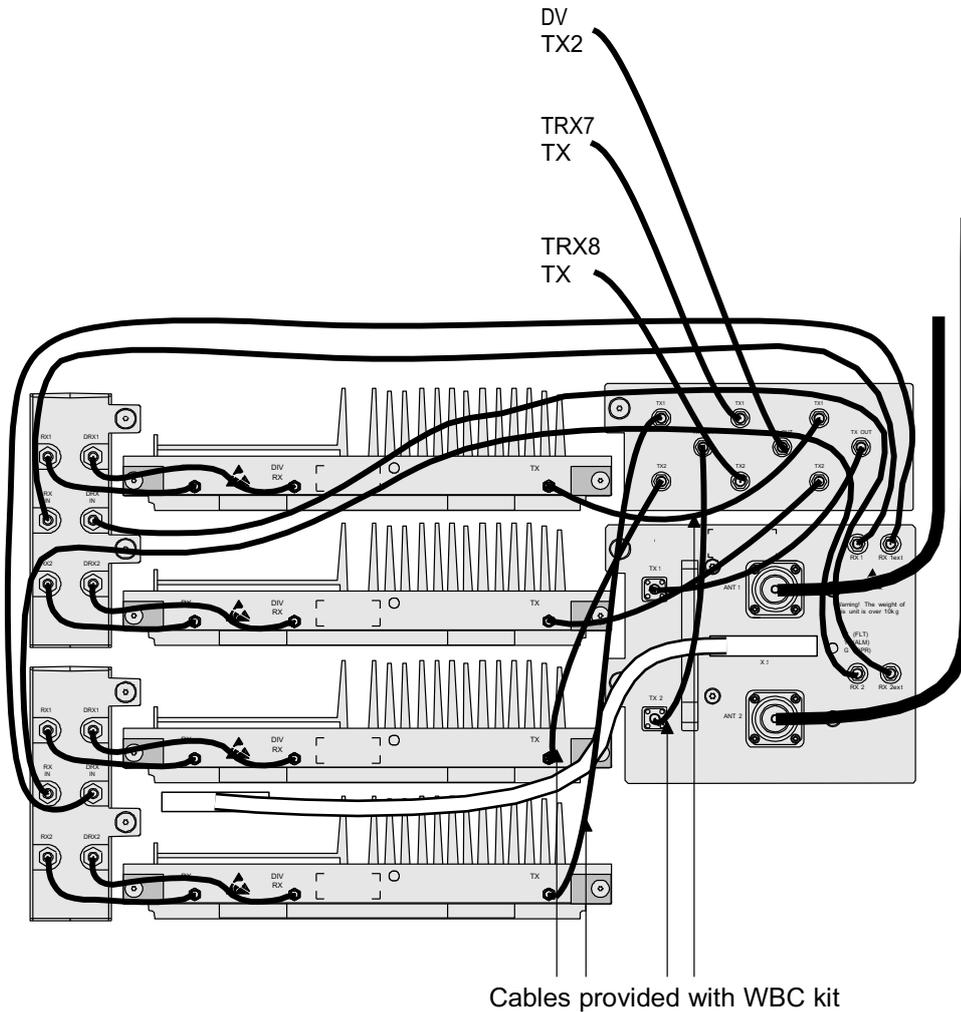
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Figure 15. 2-way WBC, 4 - TSxx sector 1



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Figure 16. 2-way WBC, 4 - TSxx sector 2



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Figure 17. 2-way WBC, 4 - TSxx sector 3



Note

Sectors 1 (TRX 1 to 4) and half of sector 2 (TRX 5 and 6) are connected as Figure 2-way WBC, 6 - TSxx sector.

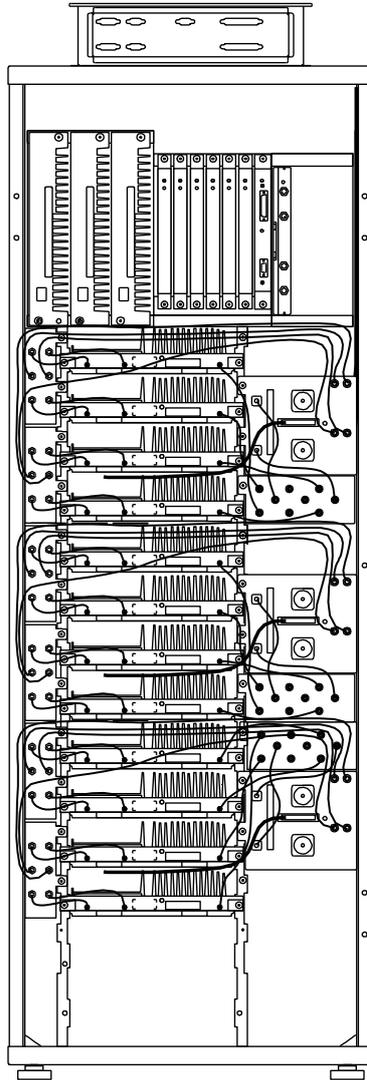
Sector 3 (TRX 9 to 12) connected as Figure 2-way WBC, 4 - TSxx sector but inverted.

The lower half of sector 2 (TRX 7 and 8) is connected between the two above layouts with the additional connections:

- TRX7: TX is connected to lower WCxT block B TX 1
- TRX8: TX is connected to lower WCxT block B TX 2
- TRX7 and TRX8: The RX and DIV RX are connected the fourth M2xA the same as the other TRX units
- Lower WCxT block B TX Out is connected to the middle DVxx TX 2
- Middle DVxx RX Test is connected to Fourth M2xA DRX In
- Middle DVxx RX 2 is connected to Fourth M2xA RX In

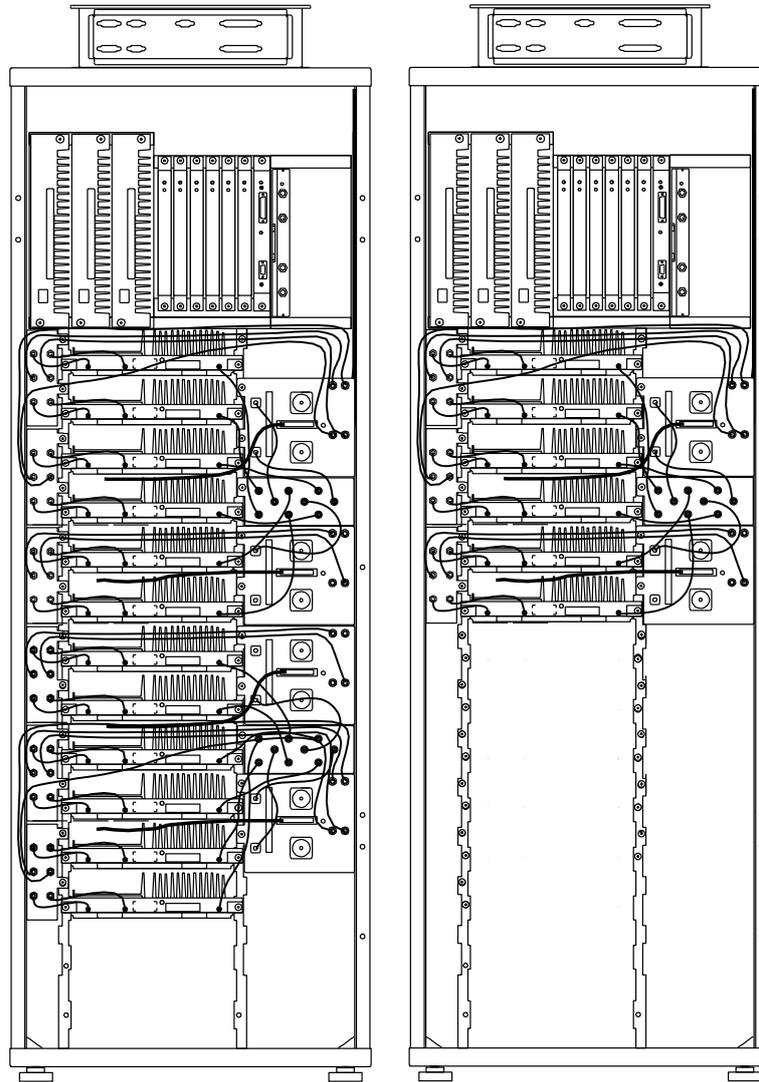
The cables supplied with the WCxT kit are to be used for the following connections:

- Sector 1:
 - TRX1 to higher WCxT block A TX2
 - Sector 2:
 - TRX6 to higher WCxT block B TX2
 - Output from block B to middle DV TX2
 - Sector 3:
 - TRX10 to lower WCxT block C TX2
 - TRX11 to lower WCxT block A TX1
 - TRX12 to lower WCxT block A TX2
 - Output from block A to lower DV TX2
-



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Figure 18. 4+4+4 two-way WBC



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Figure 20. 6+6+6 two-way WBC

3.4 4-way Wideband combining options

With 4-way Wideband Combining (WBC), the TX signals from four TSxx units are combined using three WCxA units in the following manner:

1. The first WCxA unit combines the TX signals from two of the four TSxx units.
2. The second WCxA unit combines the TX signals from the other two TSxx units.
3. The third WCxA unit combines the two combined signals. The third WCxA unit then feeds the combined signal to the antenna through the TX port of the DVxx unit.

A sector can have 4-way WBC and dual variable gain duplex filtering with 4, 8, or 12 TSxx sectors.

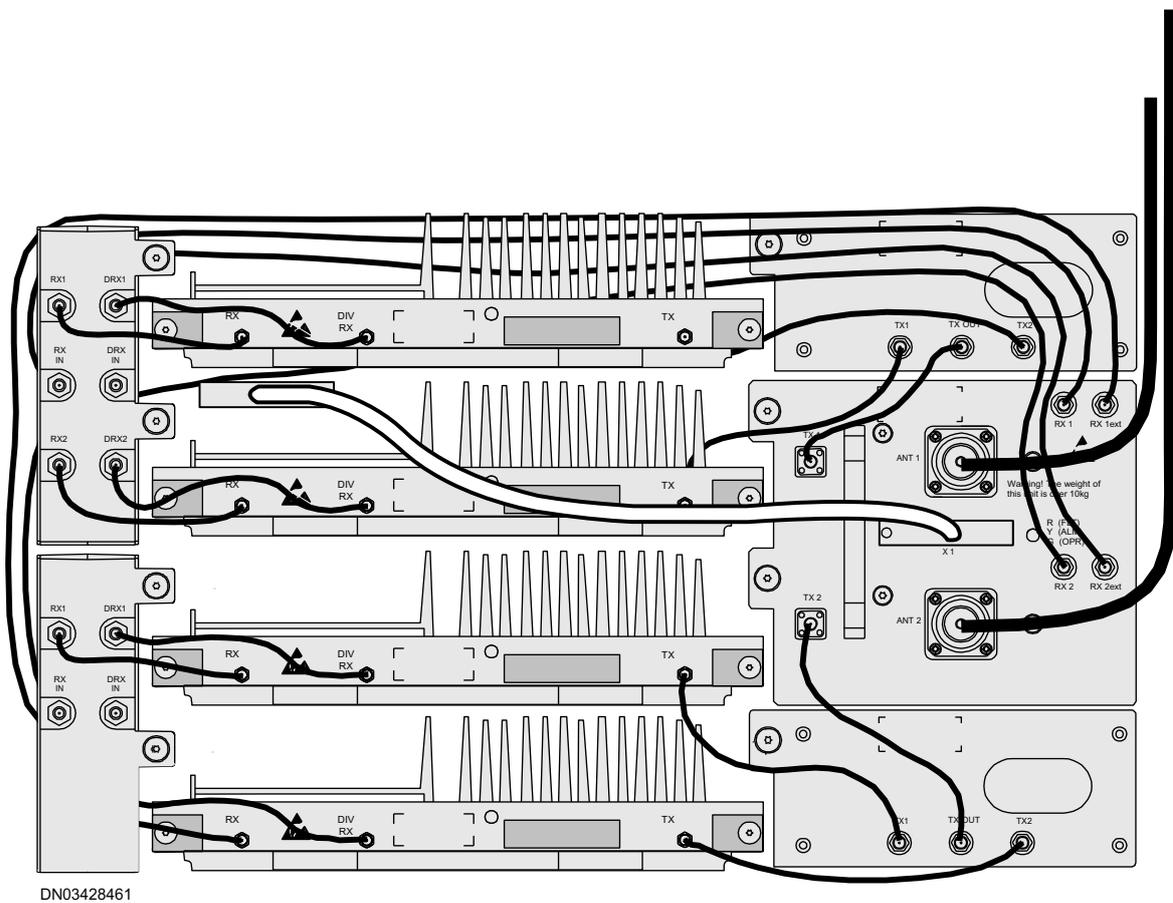
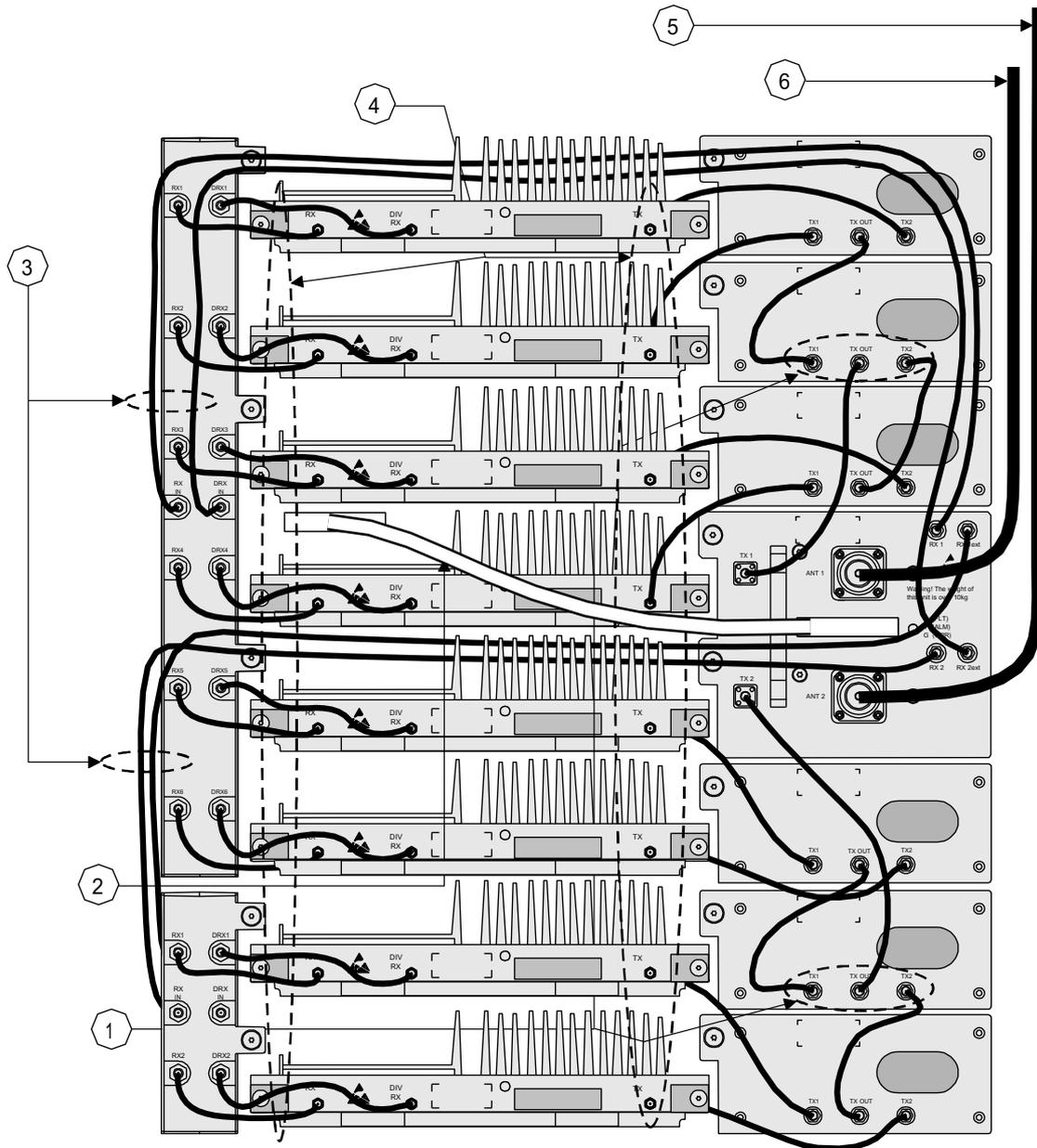


Figure 21. 4-way WBC, 4-TSxx sector

1	#993747x (3 places)
2	#993857x (12 places)

3	DVxx to RFU Backplane #993997x
4	#994081x (4 places)
5	Antenna 2: TX/RX 2, Diversity RX 1
6	Antenna 1: TX/RX 1, Diversity RX 2

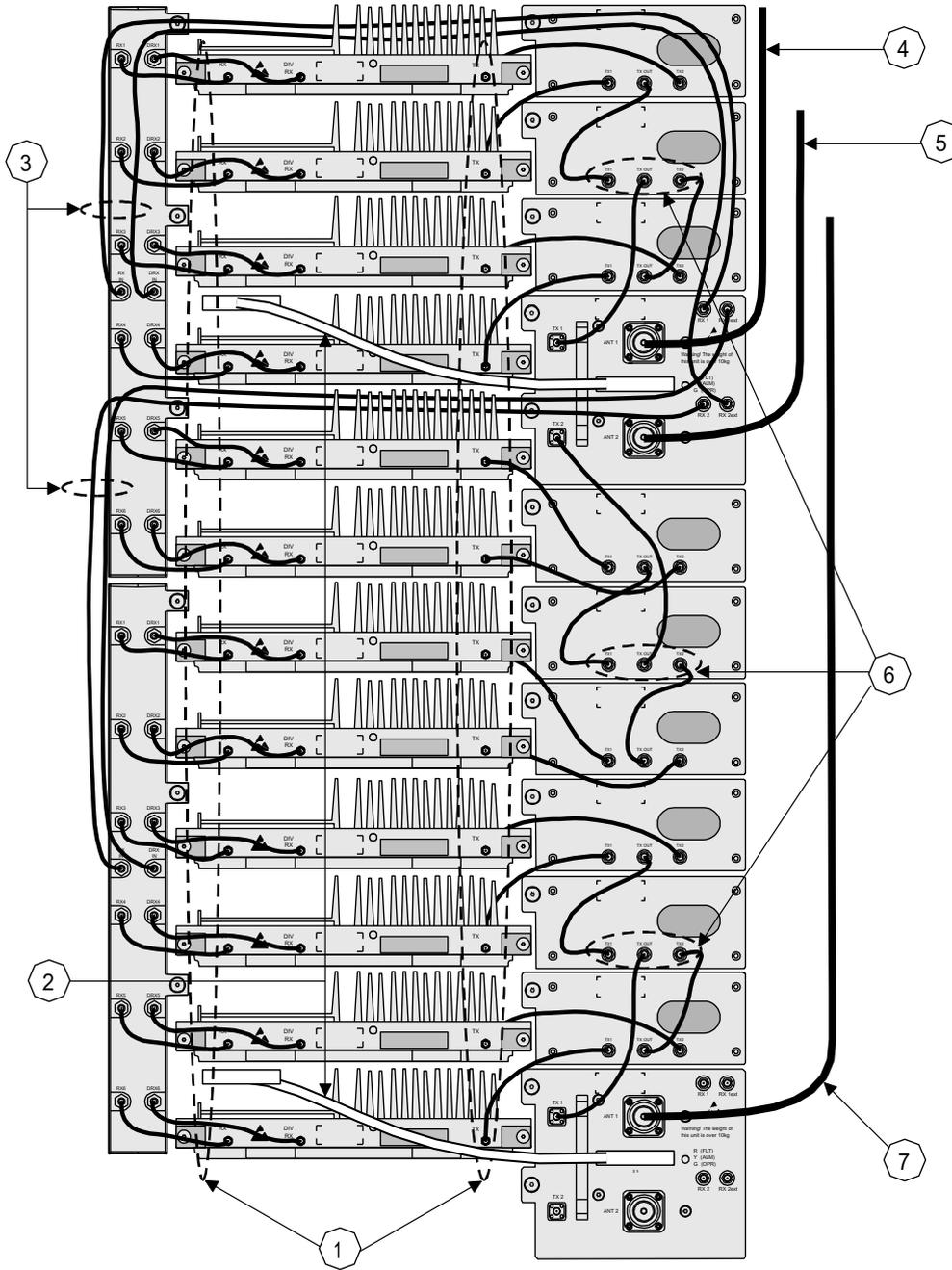


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Figure 22. 4-way WBC, 8-TSxx sector

1	#993747x (six places)
2	DVxx to RFU Backplane #993997x

3	#993856x (four places)
4	#993857x (24 places)
5	Antenna 2: TX/RX 2, Diversity RX 1
6	Antenna 1: TX/RX 1, Diversity RX 2,



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Figure 23. 4-way WBC, 12-TSxx sector

1	#993857x (36 places)
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2	DVxx to RFU Backplane #993997x
3	#993856x (four places)
4	Antenna 1: TX TSxx 1-4, RX 1 Diversity RX 2,
5	Antenna 2: TX TSxx 5-8, RX 2 Diversity RX 1
6	#993747x (nine places)
7	Antenna 3: TX TSxx 9-12



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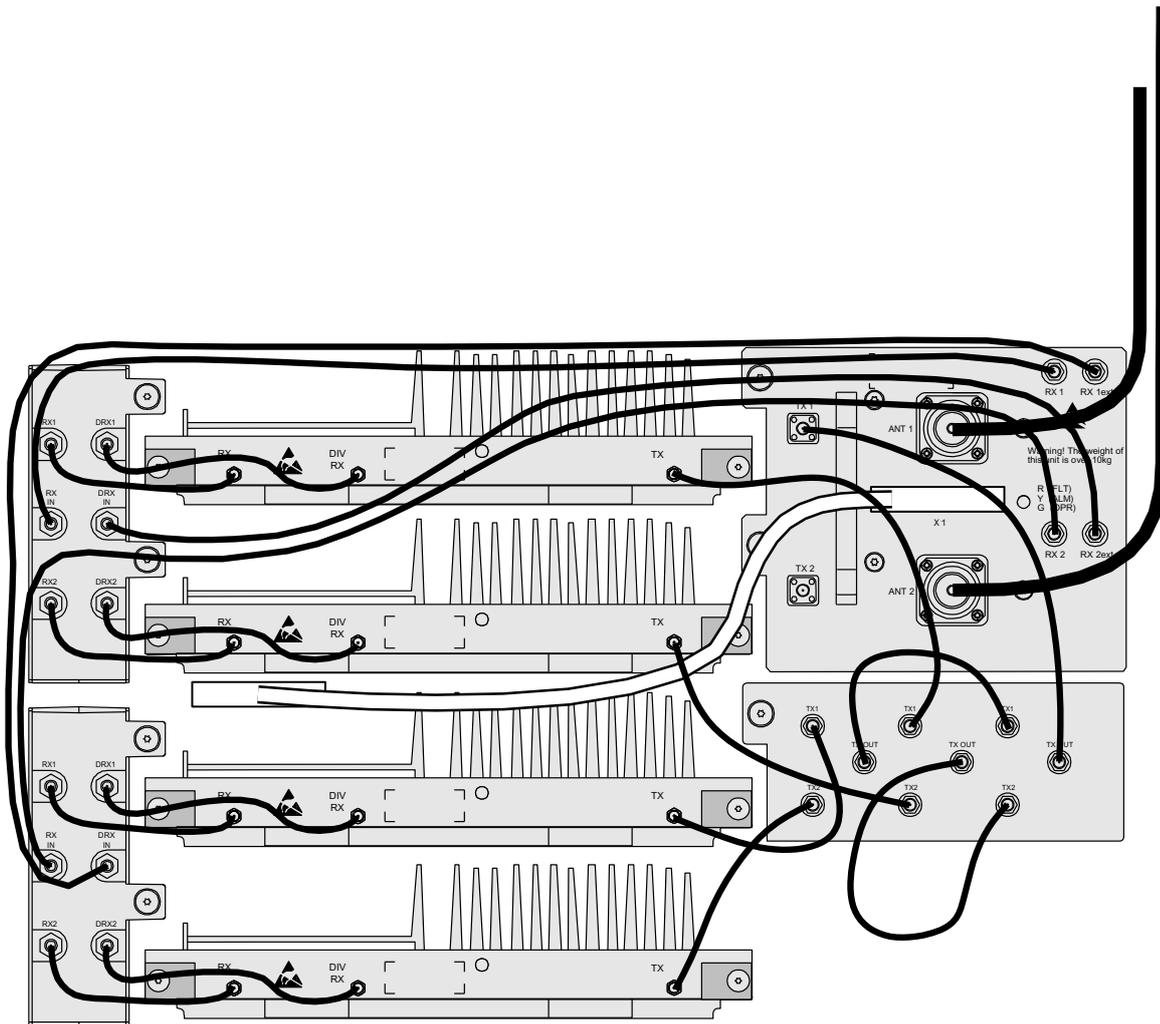
Figure 24. 12+12+12, DVxx, 4-way WBC

3.5 4-way Wideband combining options for the Triple Wideband Combiner (WCxT) unit

With 4-way Wideband Combining (WBC), the TX signals from four TSxx units are combined using all three blocks (A, B, and C) of the WCxT unit in the following manner:

1. The first block of the WCxT unit combines the TX signals from two of the four TSxx units.
2. The second block of the WCxT unit combines the TX signals from the other two TSxx units.
3. The third block of the WCxT unit combines the two combined signals; then feeds the combined signal to the antenna through the TX port of the DVxx unit.

A sector can have 4-way WBC and dual variable gain duplex filtering with 4, 6, 8, or 12 TSxx sectors.



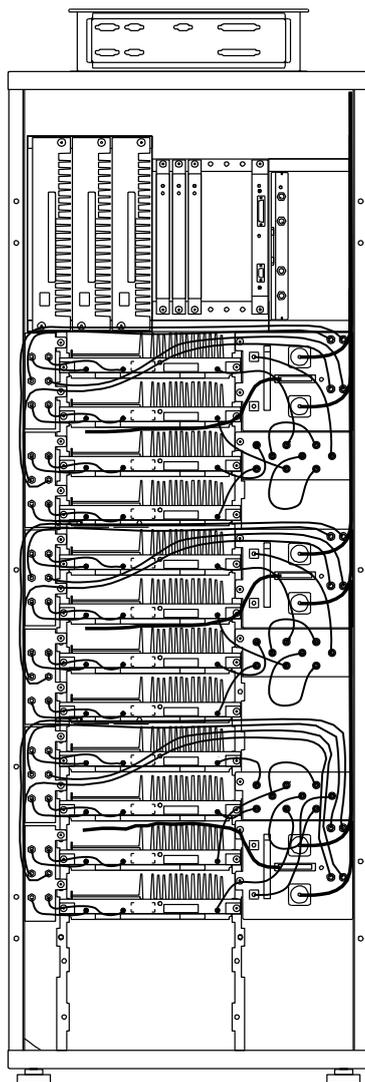
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Figure 25. 4-way WBC, 4 - TSxx sector

➔ Note

Sectors 1 (TRX 1 to 4) and 2 (TRX 5 to 8) are connected as Figure 4-way WBC, 4 - TSxx sector.

Sector 3 (TRX 9 to 12) connected as Figure 4-way WBC, 4 - TSxx sector but inverted.



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Figure 26. 4+4+4 4-way WBC

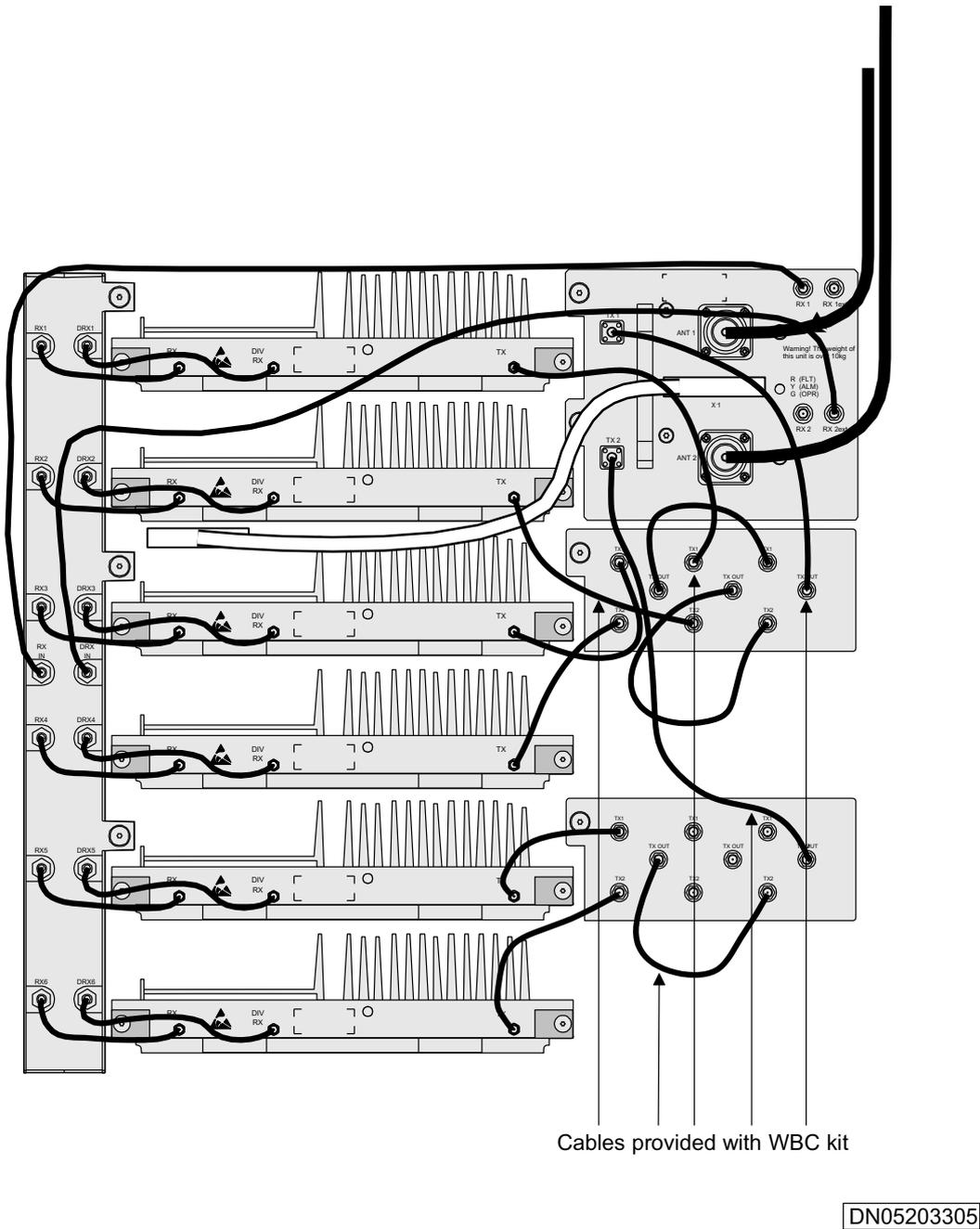
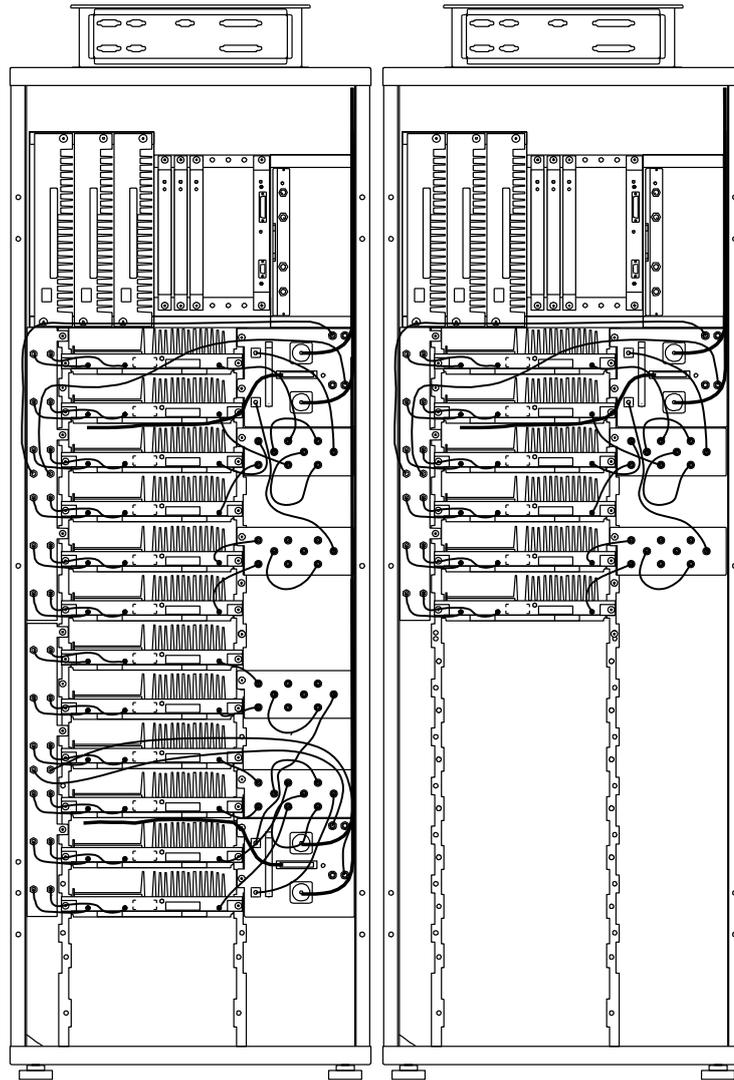


Figure 27. 4-way WBC, 6 - TSxx sector

➔ Note

Sectors 1 (TRX 1 to 6) and 3 (TRX 13 to 18) are connected as Figure 4-way WBC, 4 - TSxx sector.

Sector 3 (TRX 7 to 12) is connected as Figure 4-way WBC, 6 - TSxx sector but inverted.



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Figure 28. 6+6+6 4-way WBC

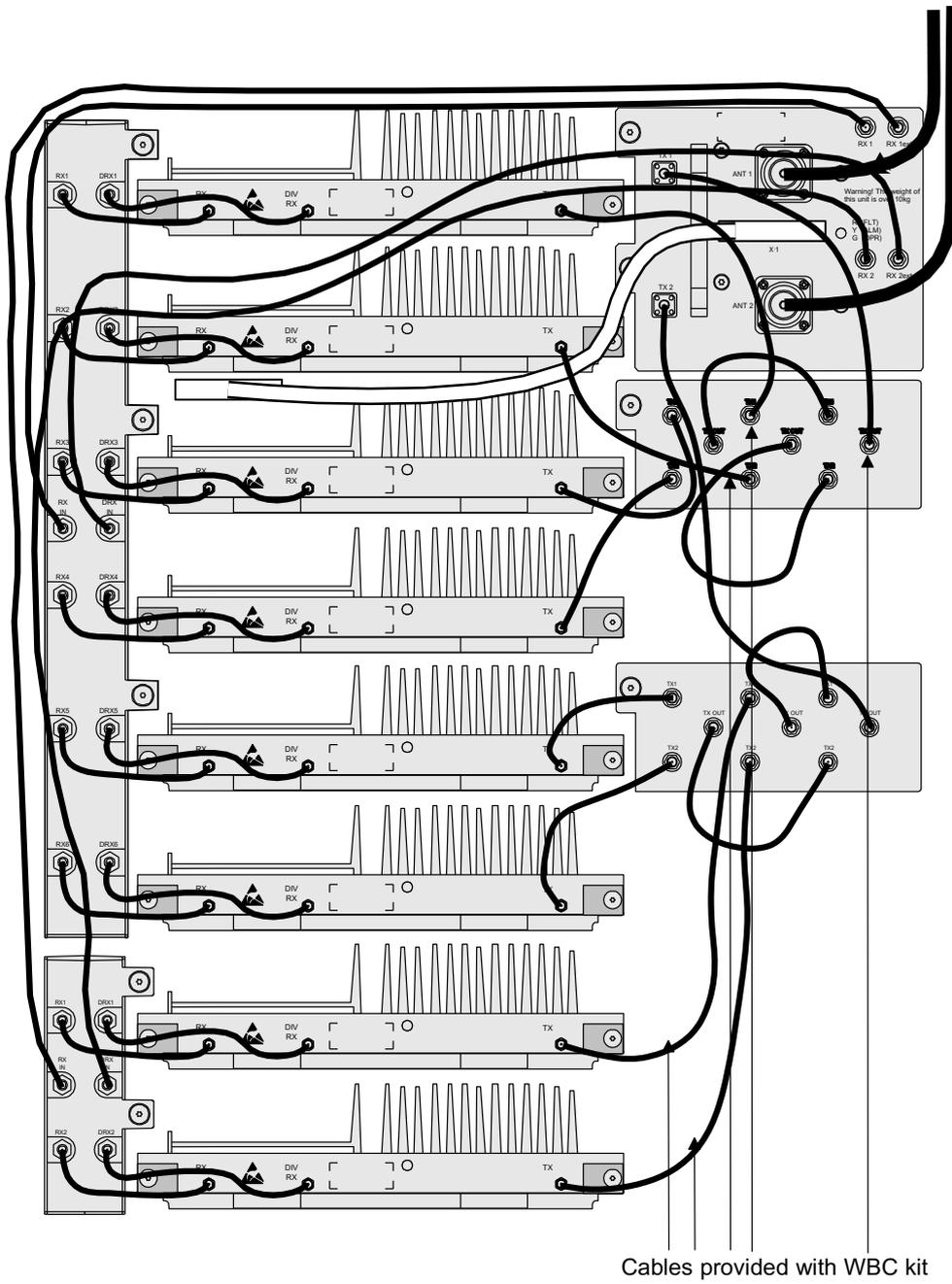


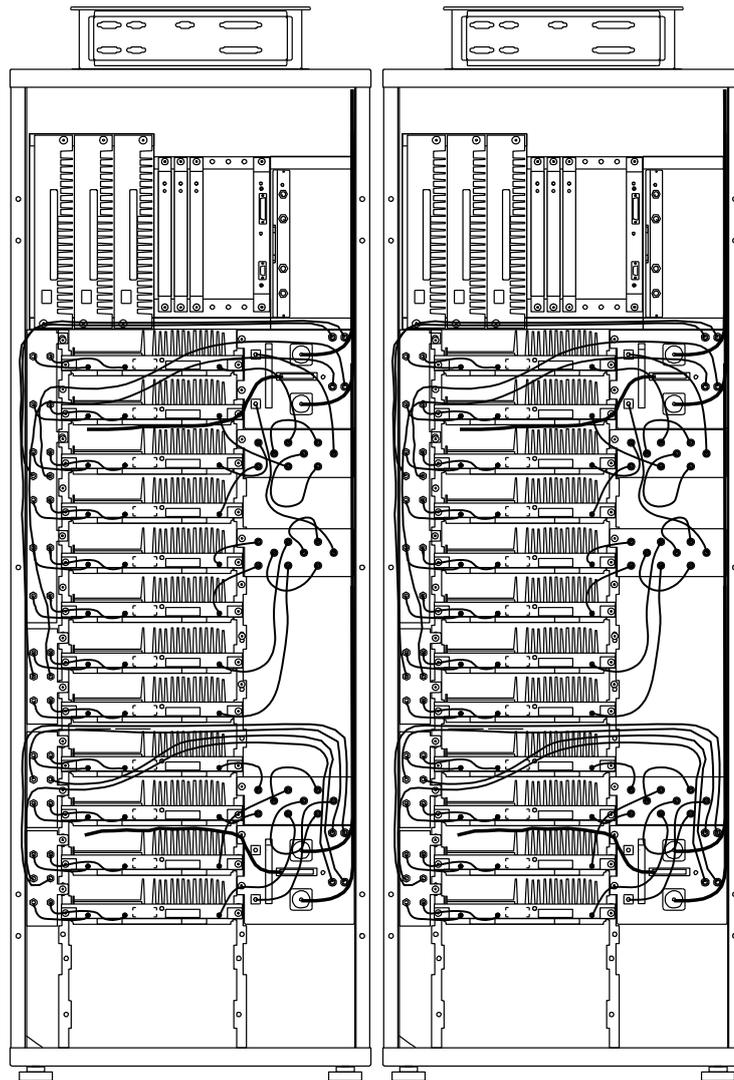
Figure 29. 4-way WBC, 8 - TSxx sector



Note

Sectors 1 and 2 are connected as Figure 4-way WBC, 8 - TSxx sector.

Sector 3 is split between each cabinet with each half connected as Figure 4-way WBC, TSxx sector but inverted.



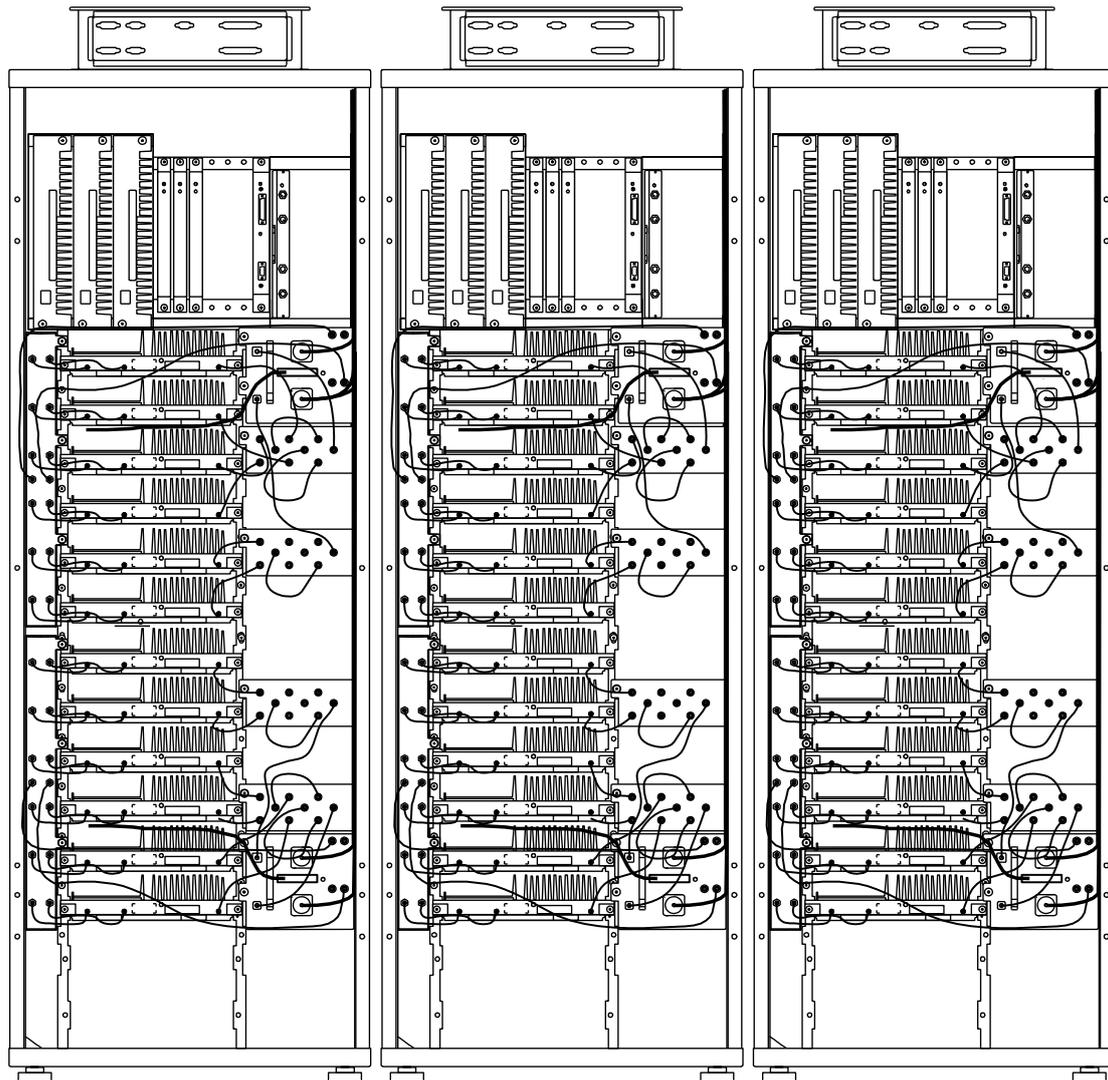
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Figure 30. 8+8+8 4-way WBC

 Note

The upper-half of each sector (Such as TRX 1 to 6, in Sector 1) is as Figure 4-way WBC, 12 - TSxx sector.

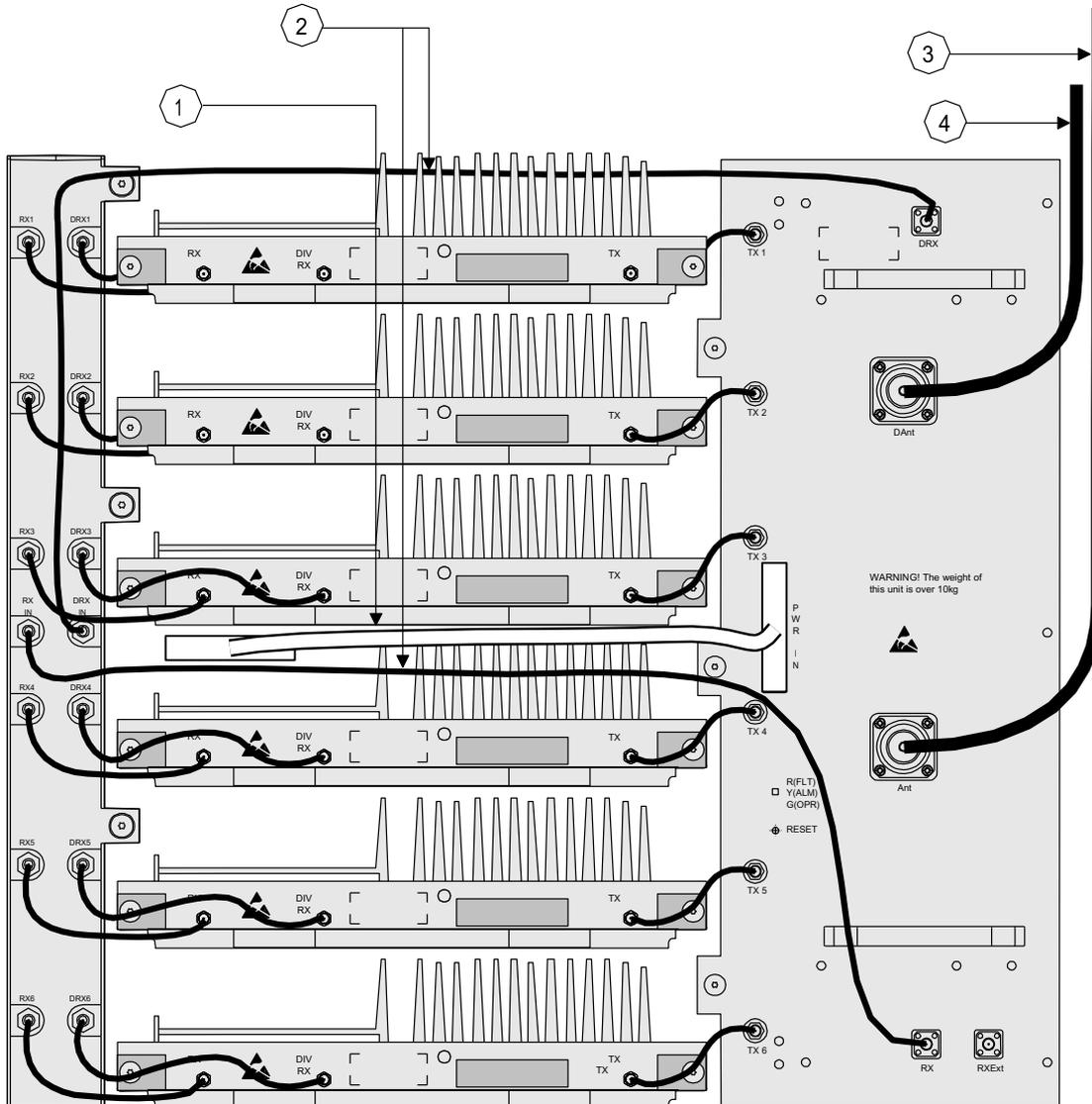
The lower-half of each sector (Such as TRX 7 to 12, in Sector 1) is as Figure 4-way WBC, 12 - TSxx sector, but inverted.



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Figure 32. 12+12+12 4-way WBC

3.6 6-sector Remote Tune combining

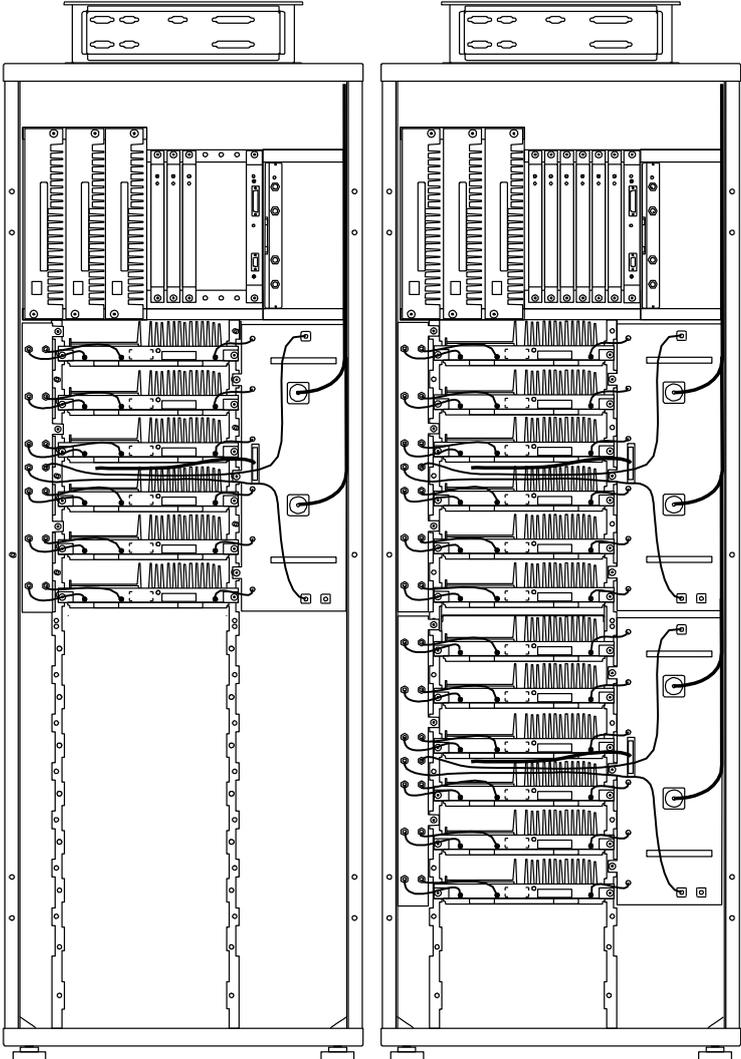


NOTE: Unlabeled cables are #993857x (18 places)

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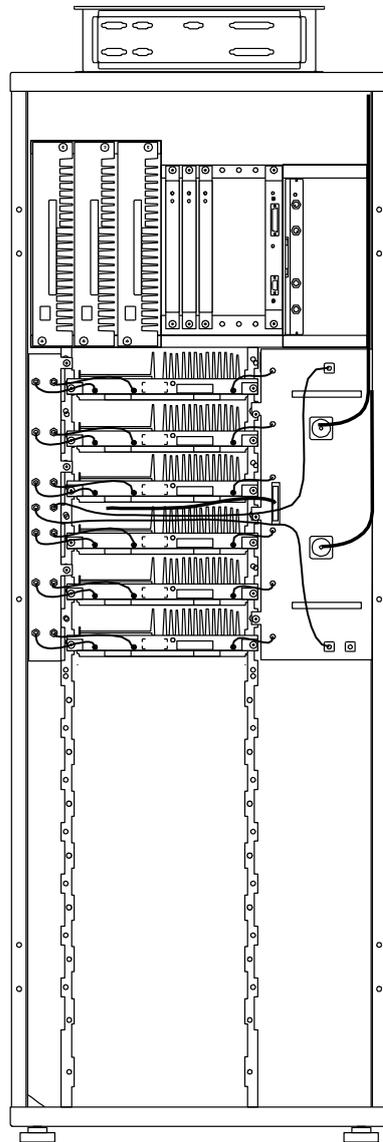
1	DVxx to RFU backplane #993997x
2	#993856x
3	Antenna1: TX/RX
4	Antenna 2: Diversity RX

Figure 33. RTC, 6-TSxx sector



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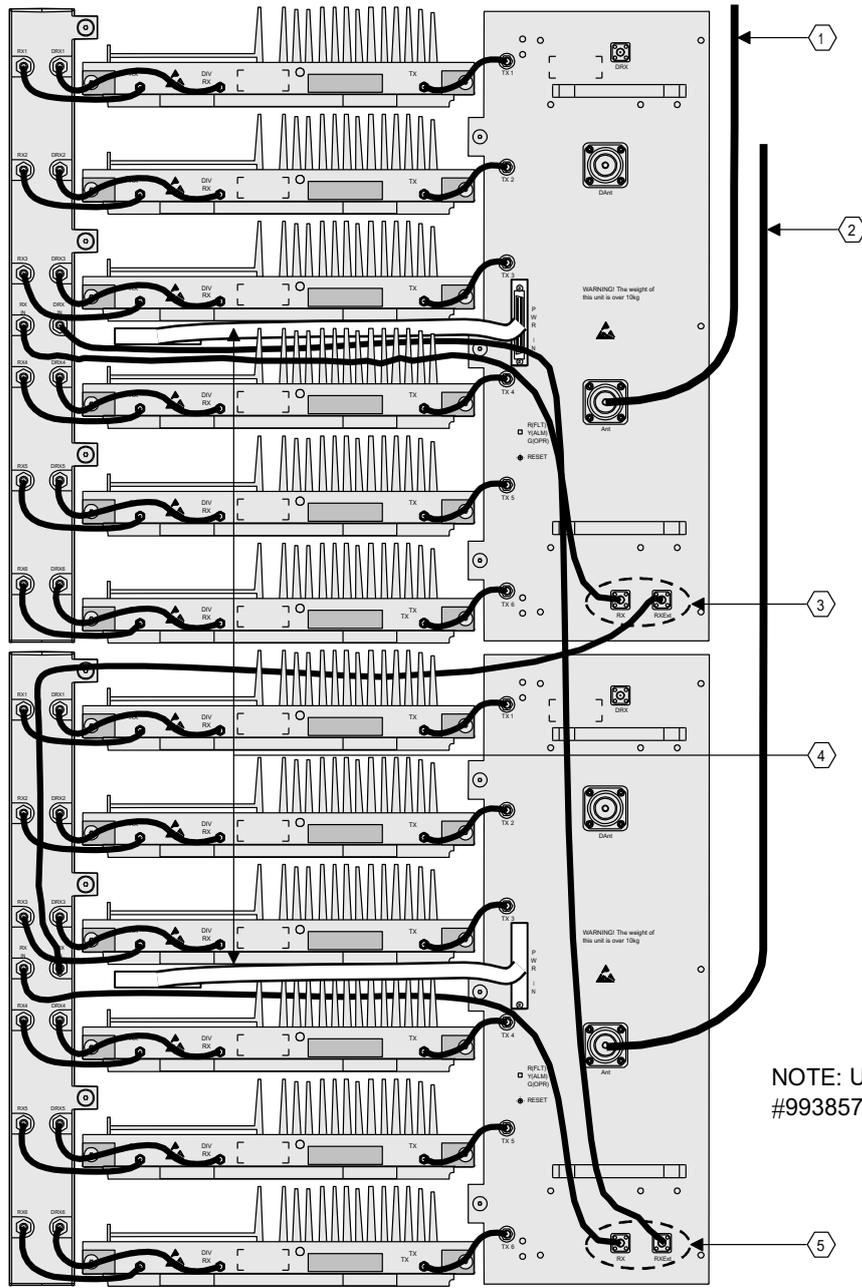
Figure 34. 6+6+6, RTC



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Figure 35. 6 Omni, RTC

3.7 12-sector Remote Tune combining



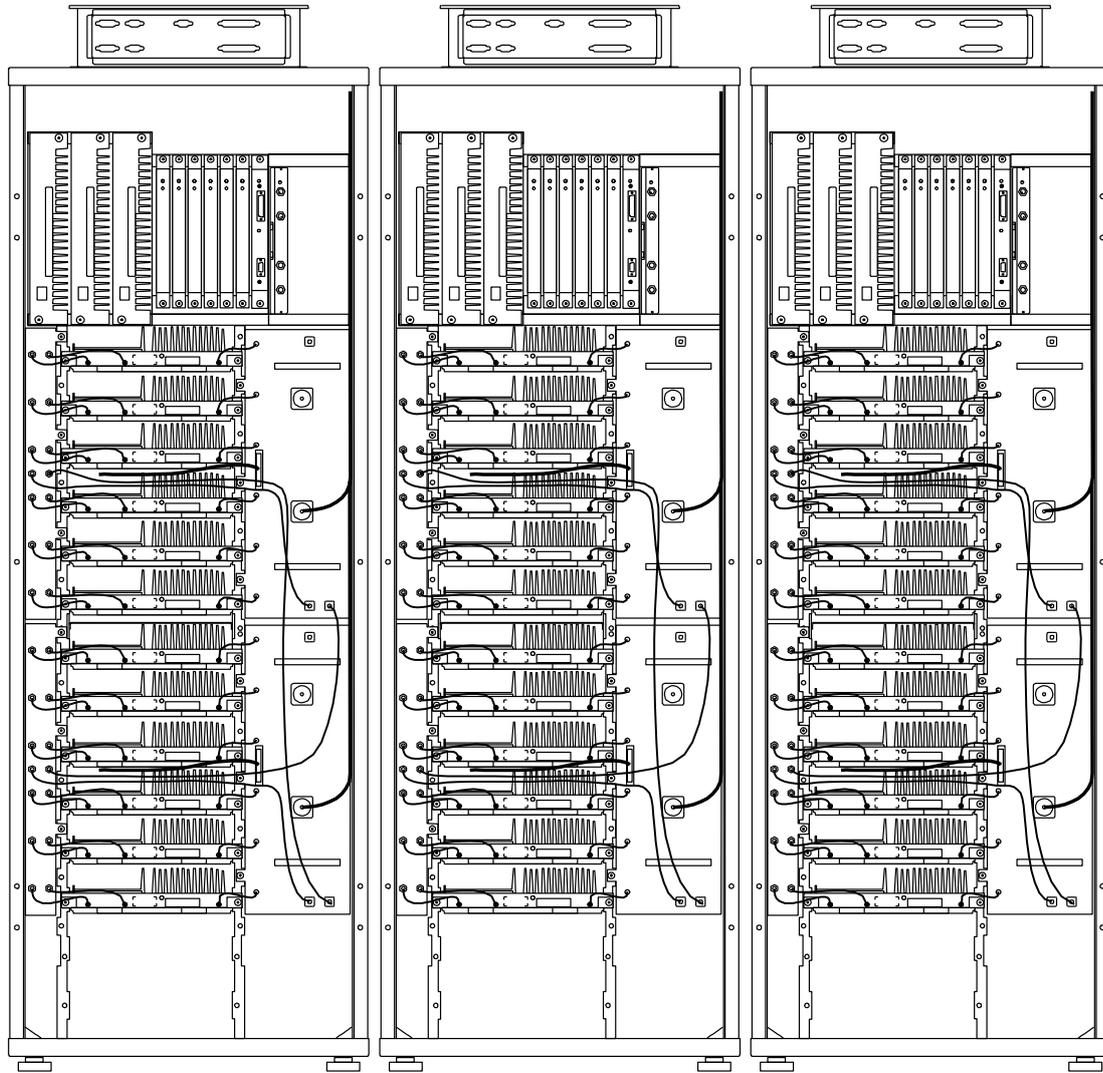
NOTE: Unlabeled cables are #993857x (36 places)

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1	Antenna1: TX/RX 1, DRX 2
2	Antenna 2: TX/RX 2, DRX 1
3	#993856x (two places)
4	Dvxx to RFU Backplane #993997x

5	#993856x (two places)
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Figure 36. RTC, 12-TSxx sector

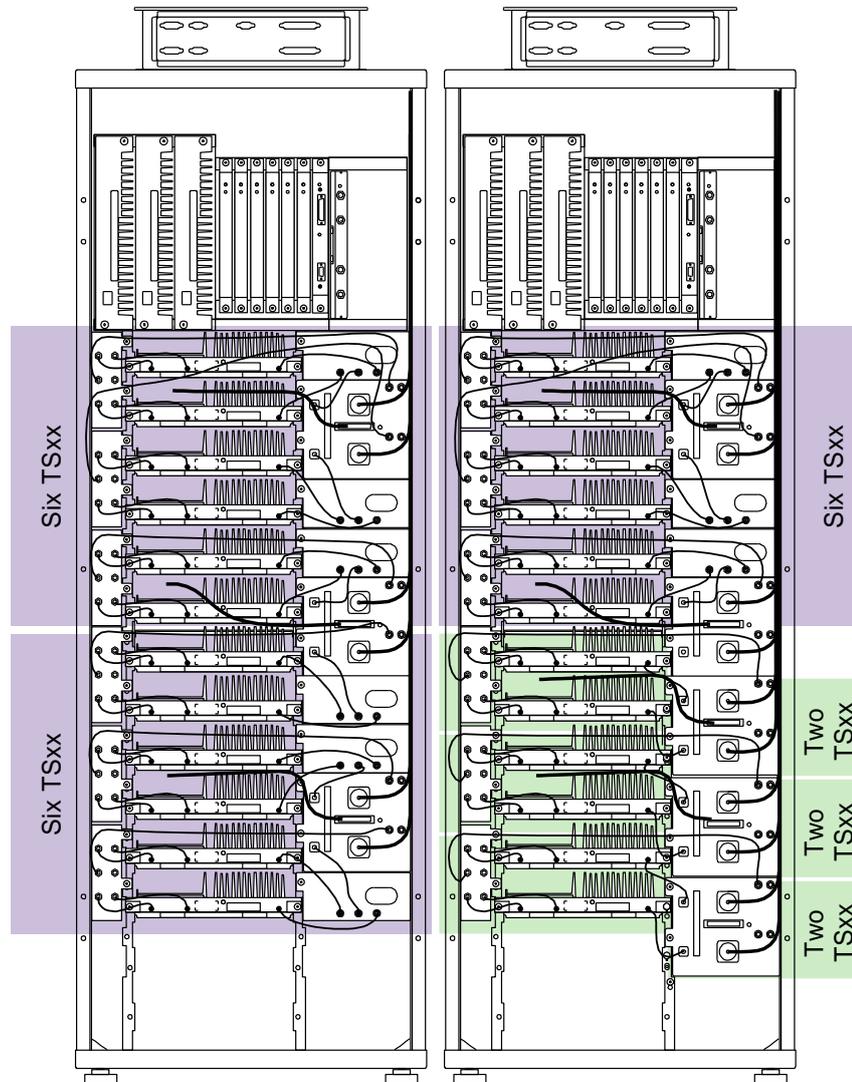


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Figure 37. 12+12+12, RTC

3.8 Dual-band combining

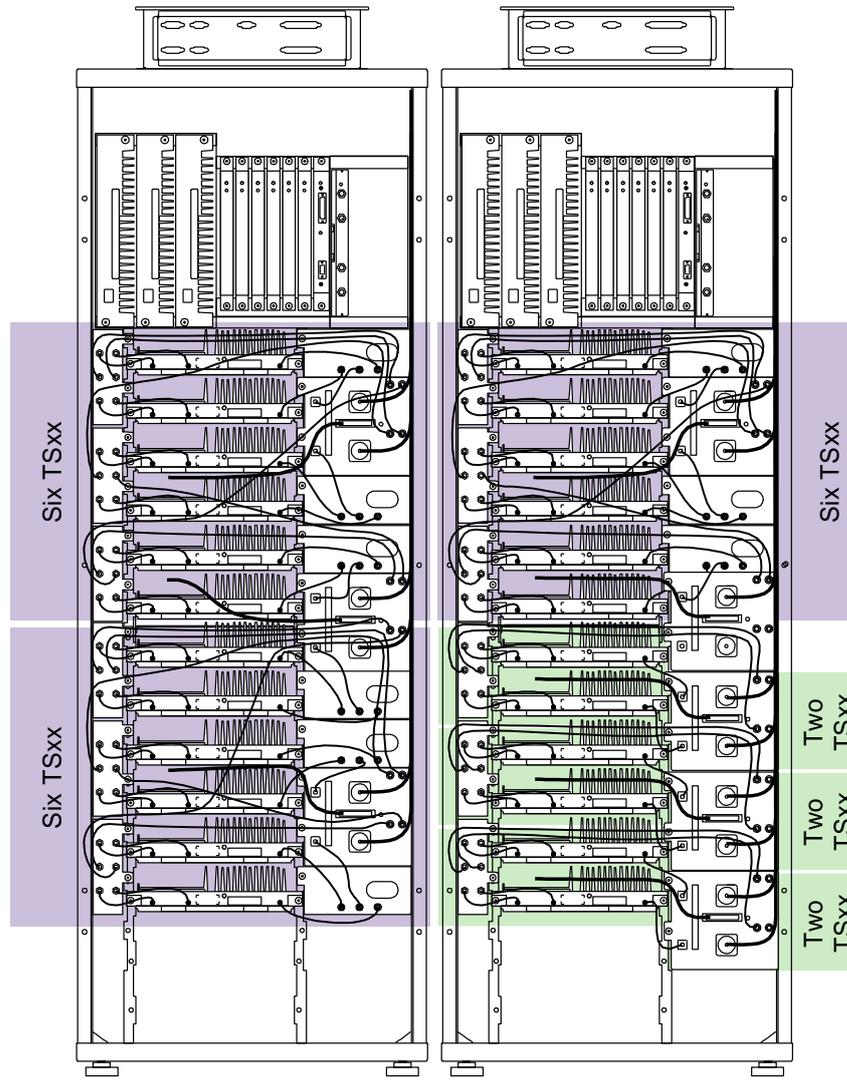
A BTS cabinet can use WBC or RTC when GSM 800/1900 or 900/1800 signals are both present. Combining bypass cannot be used.



NOTE: 900 Mhz 1800 Mhz

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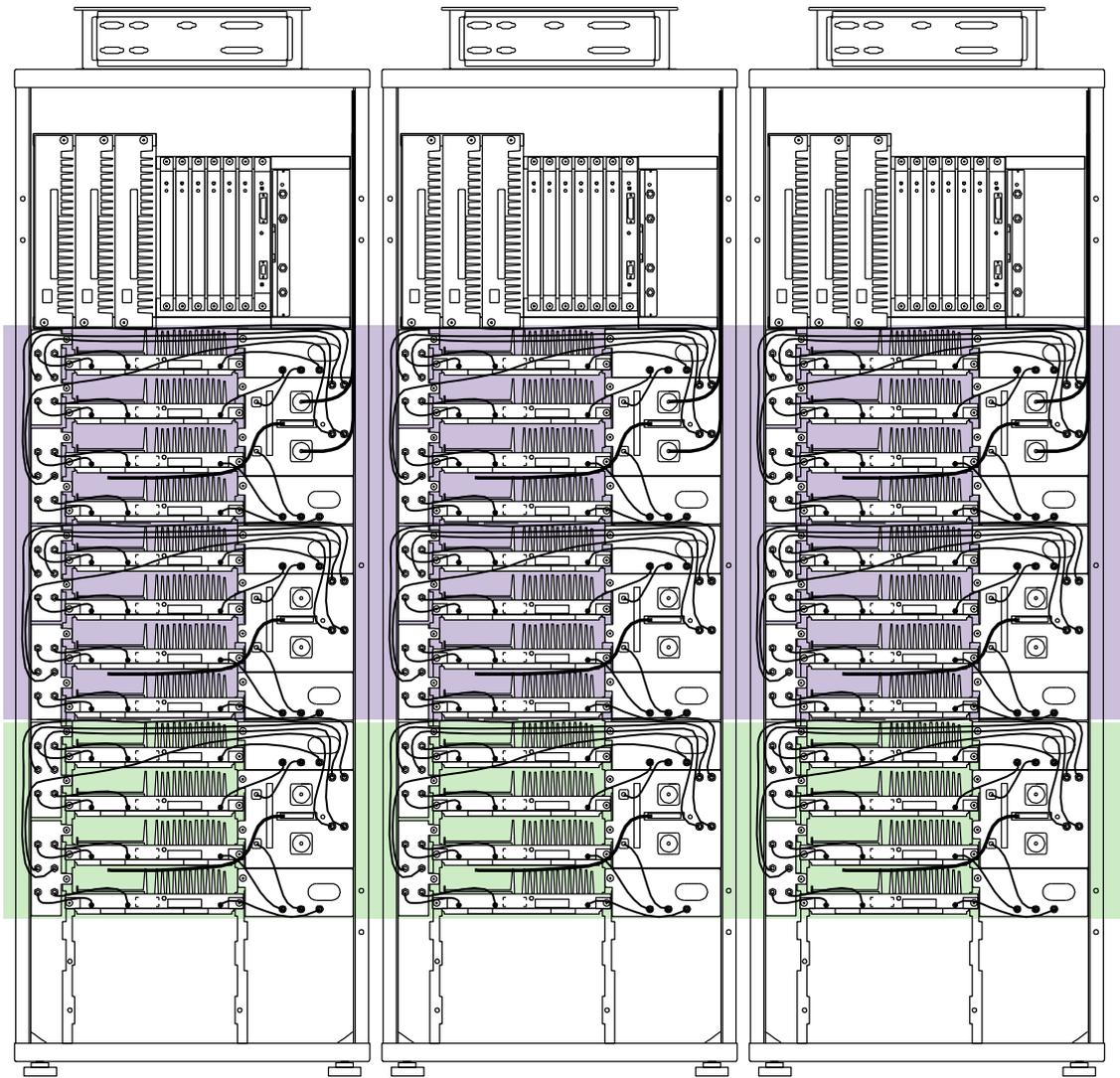
Figure 38. 6+6+6, 2+2+2, Dual Band Combining without diversity



NOTE: 900 Mhz 1800 Mhz

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Figure 39. 6+6+6, 2+2+2, Dual Band Combining with diversity



NOTE: 900 Mhz 1800 Mhz

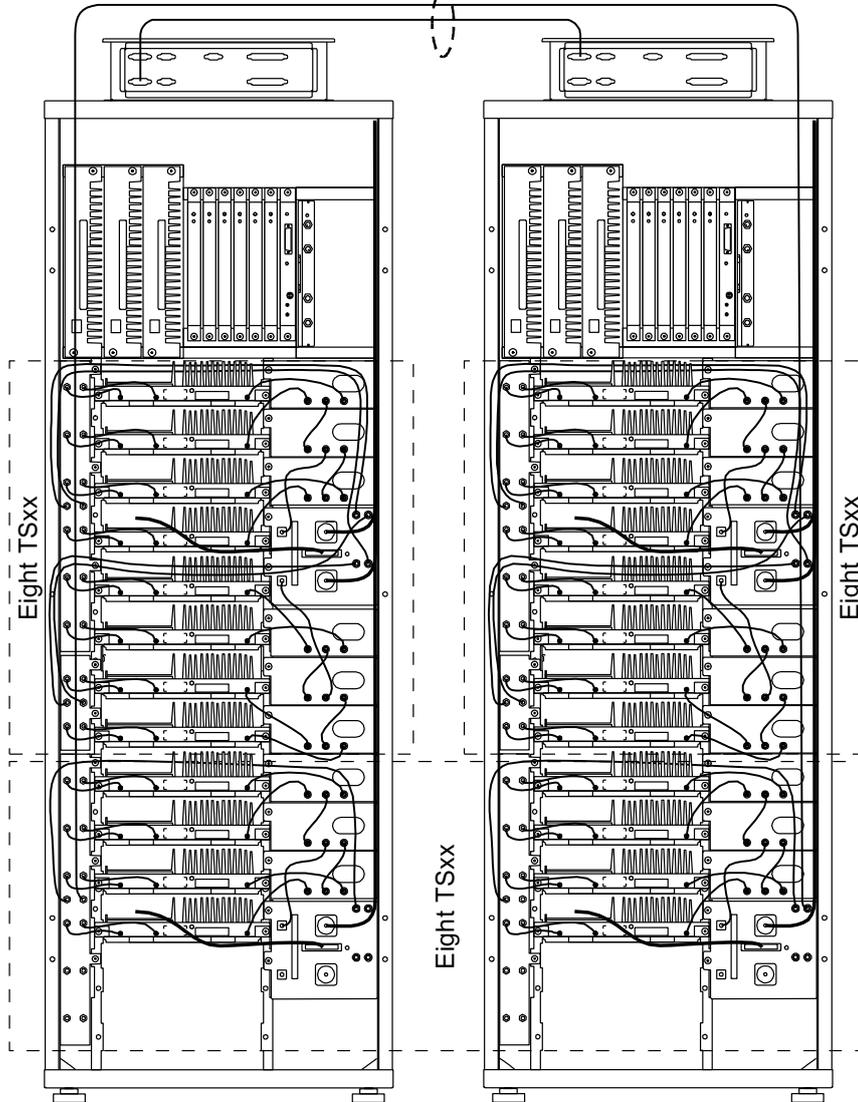
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Figure 40. 8+8+8, 4+4+4, Dual Band Combining

3.9 Horizontal sectoring

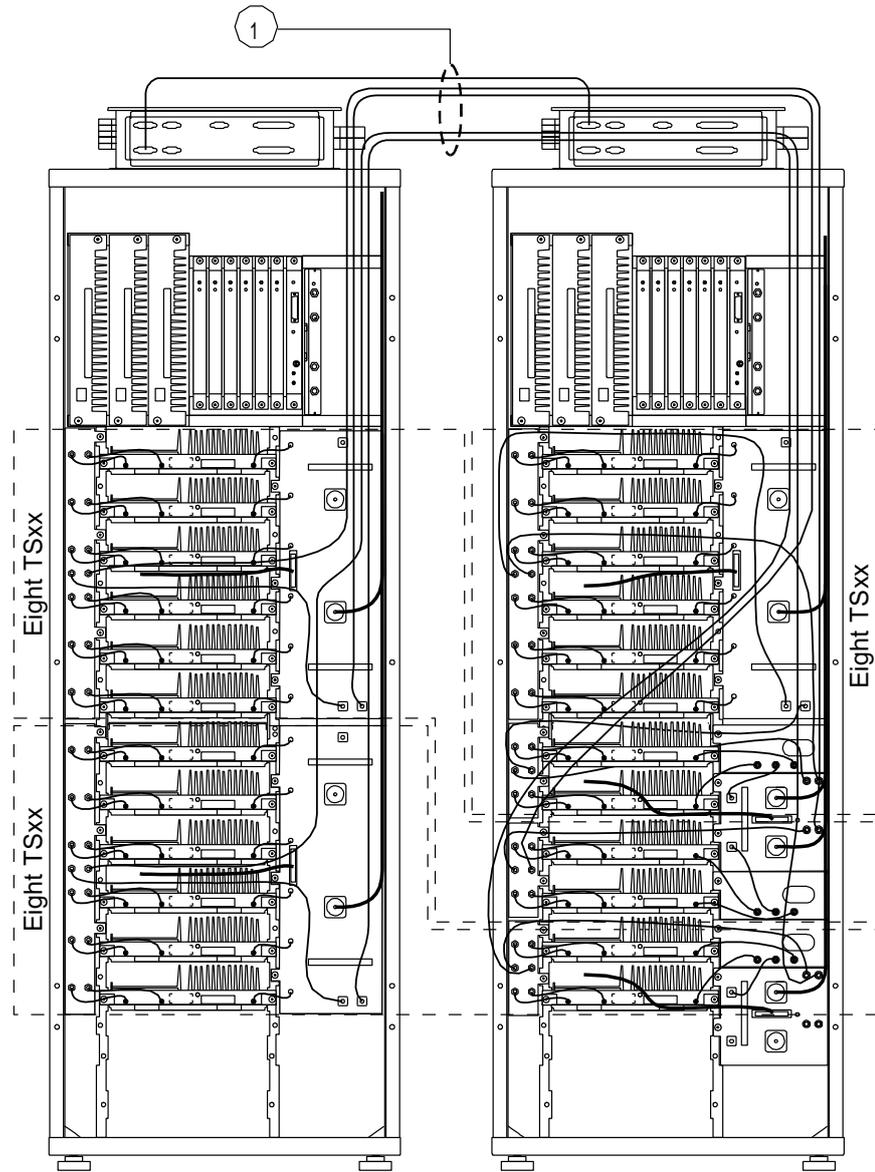
Horizontal sectoring is the common configuration where units in multiple cabinets support one antenna.

NOTE: Special inter-rack cable kit required for Diversity Signals



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Figure 41. 8+8+8, Horizontal sectoring, WBC



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1	Special inter-rack cable kit required for Diversity Signals
---	-------------------------------------------------------------

Figure 42. 8+8+8, Horizontal sectoring, RTC

4

Configurations for UltraSite EDGE BTS Mini Outdoor

4.1 Overview of configurations for UltraSite EDGE BTS Mini Outdoor

One BTS cabinet holds up to 4 TSxx TRXs which is the maximum size for a sector. As there are no combiners, only the following TRX configurations fit in a cabinet:

- 1 TRX single sector
- 2 TRX single sector
- 3 TRX single sector
- 4 TRX single sector
- 1+1 with diversity
- 1+2 with diversity
- 2+1 with diversity
- 2+2 with diversity
- 1+1+1 no diversity
- 1+1+2 no diversity
- 1+2+1 no diversity
- 2+1+1 no diversity
- 1+1+1+1 no diversity

As the dual duplexer can be shared between the sectors, the maximum amount of sectors in one cabinet is four.

The following dual band configurations can be fitted in a cabinet:

- 1/1
- 1/2
- 2/1
- 1+1/1
- 1+1/1+1
- 1+1/2
- 1/1+1
- 2/1+1

4.2 Single TRX configuration

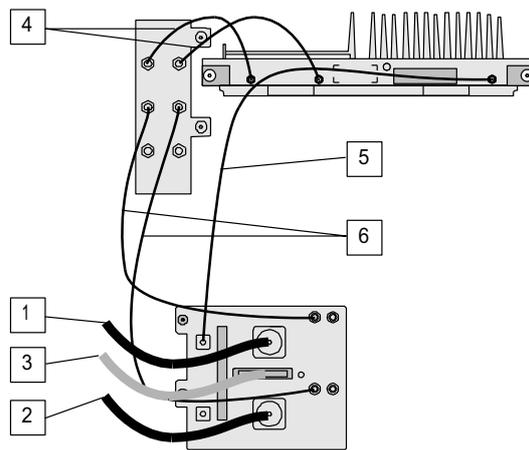


Figure 43. RF cabling for single TRX configuration

1	Antenna 1: TX1/RX1
2	Antenna 2: TX2/RX2
3	DVxx to RFU backplane #993997x
4	#993857x (two places)
5	350400400-600-N
6	#994081x two places

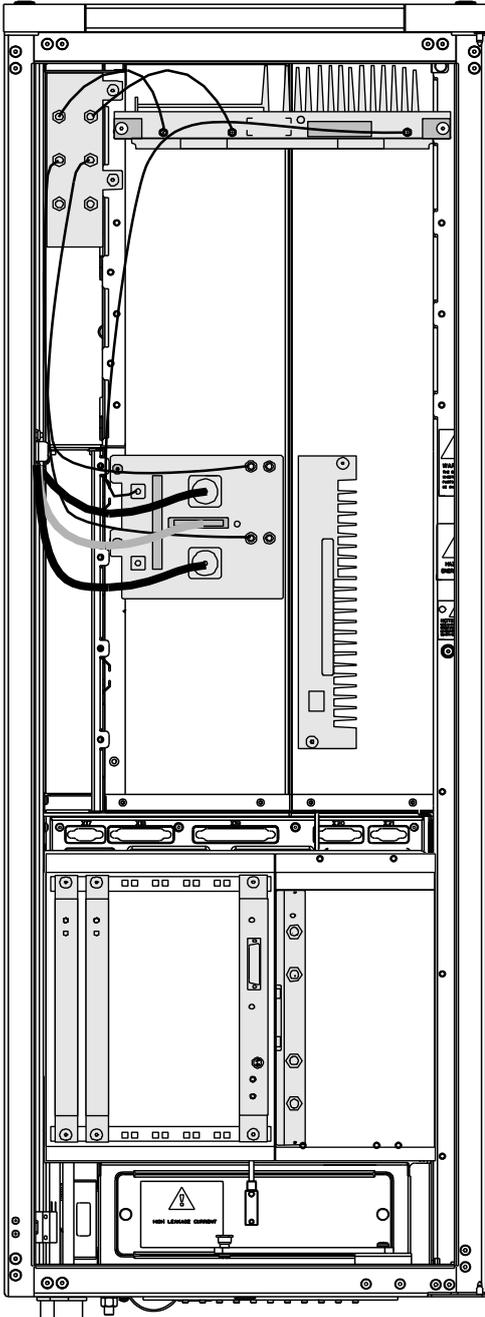


Figure 44. Single TRX cabinet configuration

4.3 1+1 configuration with diversity

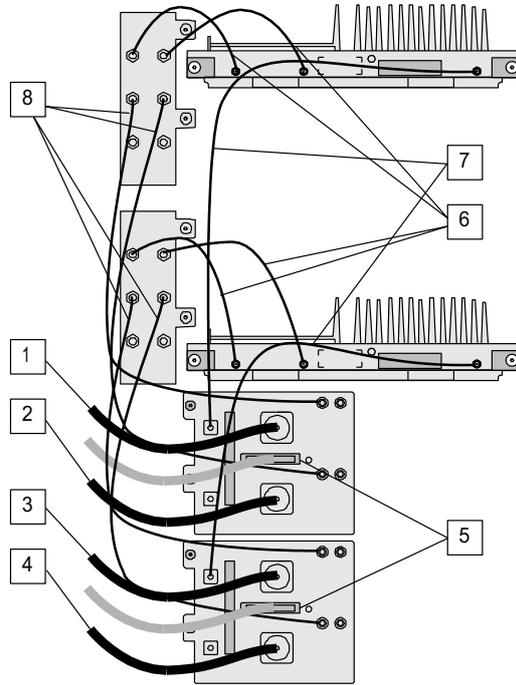


Figure 45. RF cabling for 1+1 configuration with diversity

1	Antenna 1: TX1/RX1
2	Antenna 2: RX2
3	Antenna 3: TX1/RX1
4	Antenna 4: RX2
5	DVxx to RFU backplane #993997x (two places)
6	#993857x (two places)
7	350400400-600-N (two places)
8	#994081x (four places)

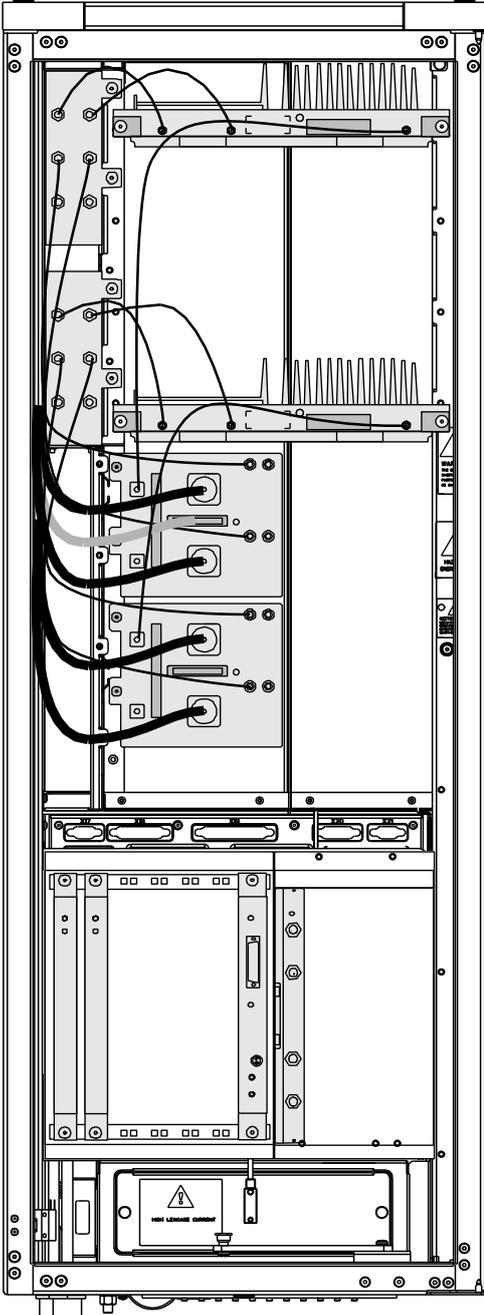


Figure 46. 1+1 cabinet configuration

4.4 1+1+1 configuration no diversity

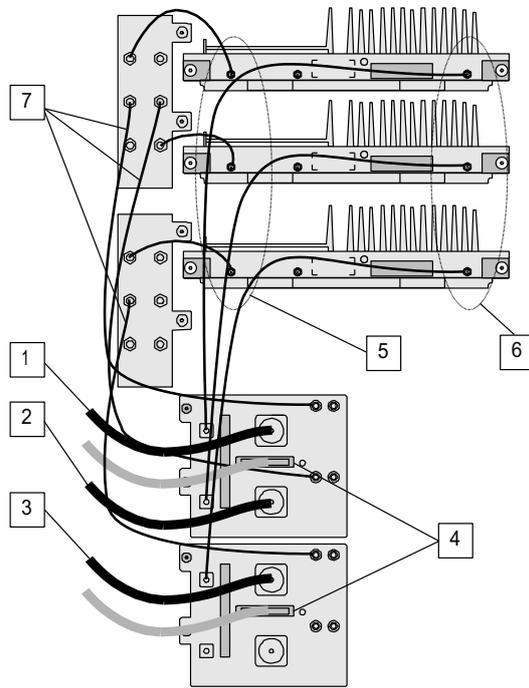


Figure 47. RF cabling for 1+1+1 configuration with no diversity

1	Antenna 1: TX1 / RX1
2	Antenna 2: TX2 / RX2
3	Antenna 3: TX1 / RX1
4	DVxx to RFU backplane #993997x (two places)
5	#993857x (three places)
6	350400400-600-N (three places)
7	#994081x (three places)

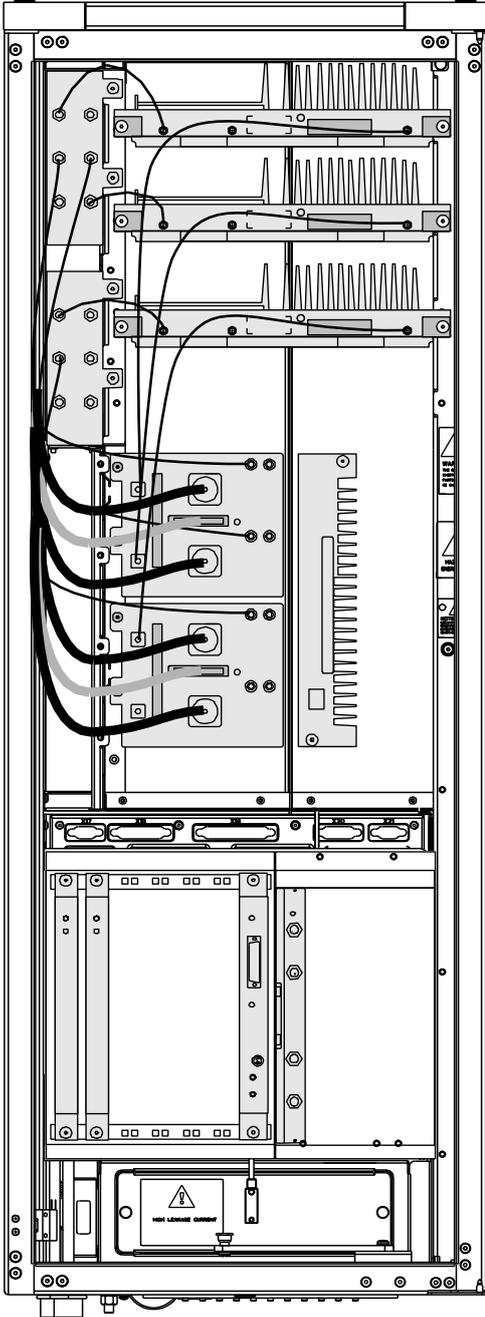


Figure 48. 1+1 cabinet configuration

4.5 2+2 with diversity

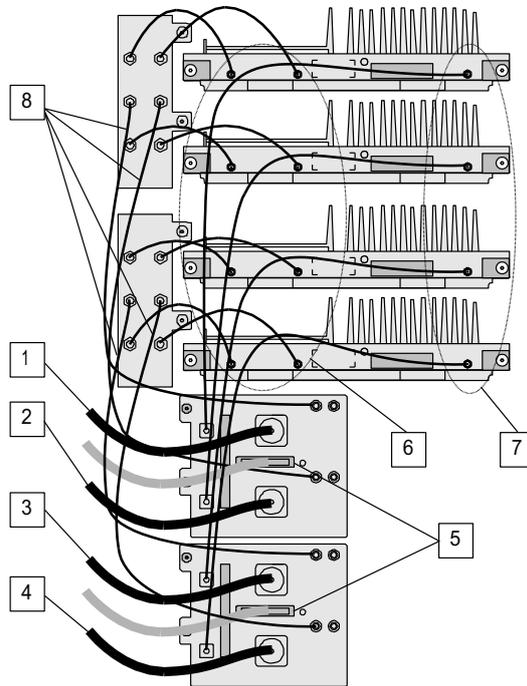


Figure 49. RF cabling for 2+2 configuration with diversity

1	Antenna 1: TX1 / RX1
2	Antenna 2: RX2
3	Antenna 3: TX1 / RX1
4	Antenna 4: RX2
5	DVxx to RFU backplane #993997x (two places)
6	#993857x (eight places)
7	350400400-600-N (four places)
8	#994081x (four places)

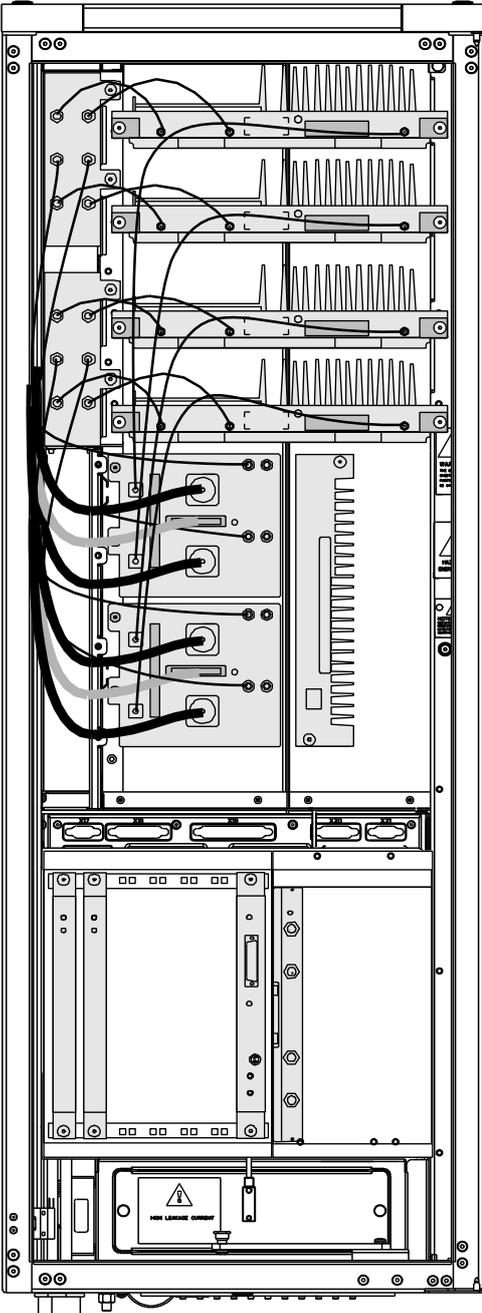
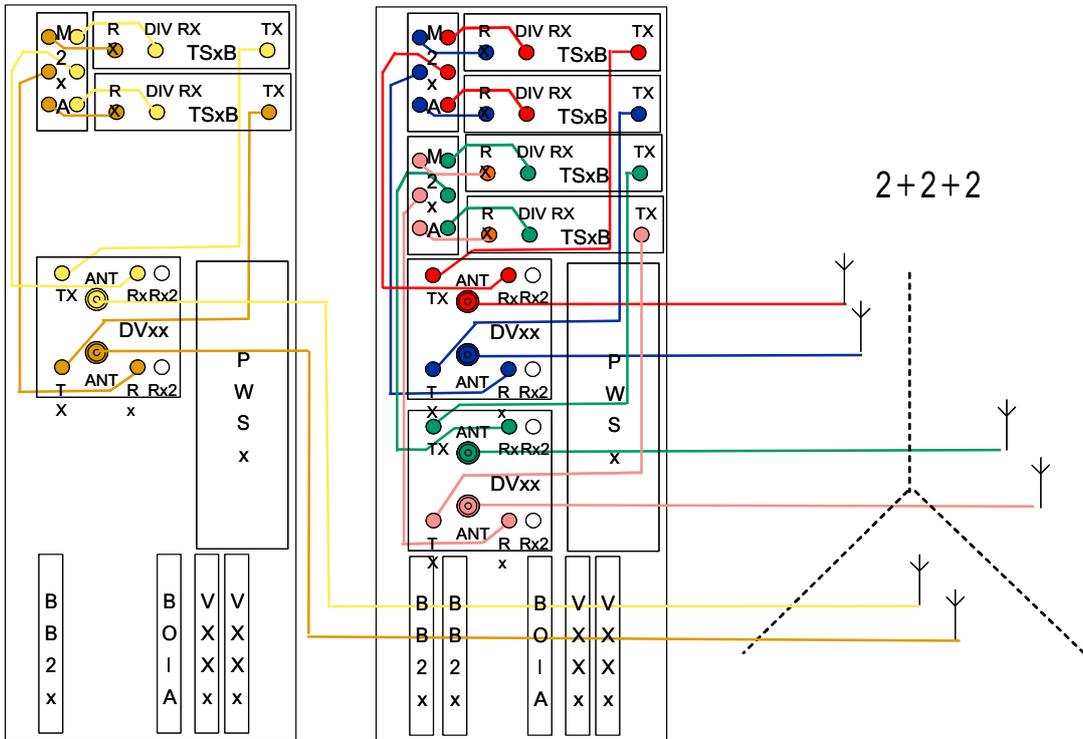


Figure 50. 2+2 cabinet configuration

4.6 2+2+2 configuration



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Figure 51. 2+2+2 configuration