# LO/IF System Requirements

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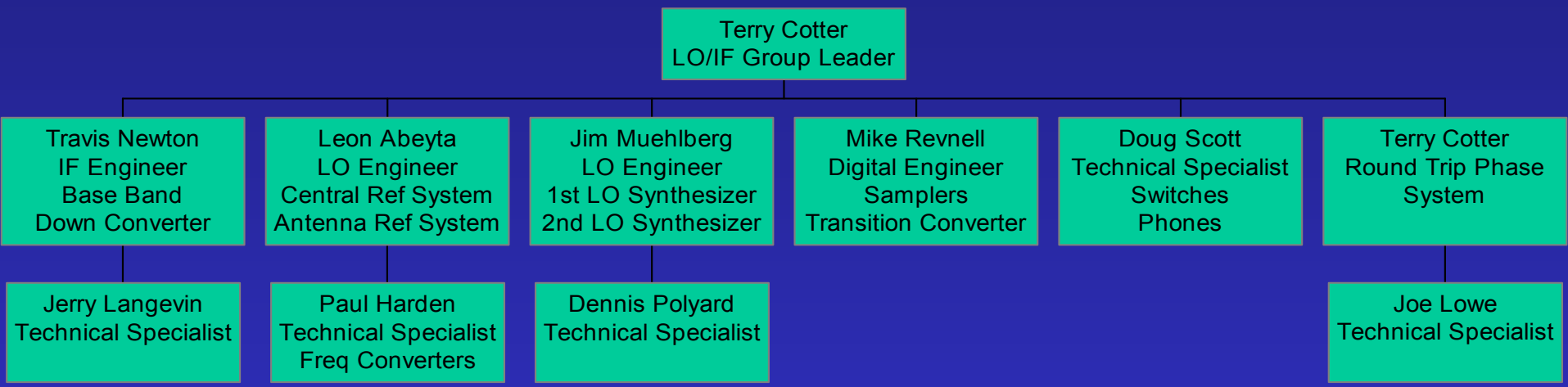


# System Overview

| Current System | |
|---|---|
| # of Modules | per Ant |
| 8+ | Power Supplies |
| 15 | IF modules |
| 14 | LO modules |
| 4 | Samplers |
| 15 | FE modules |
| 8+ | DCS modules |

| New System "proposed" | |
|---|---|
| # of Modules | per Ant |
| 3 | Power Supplies |
| 8 | IF modules |
| 8 | LO modules |
| 4 | DTS Transmitter |
| ? | FE modules |
| ? | DCS modules |
| 4 | DTS Receiver |

# System Overview

- 4/P Band Converter
- L/S/C Band Converter
- U Band Converter
- 1ST LO
- Base Band Converter
- DTS Transmitter
- LO Reference Receiver
- Antenna Reference Generator/Distributor
- Central Reference Generator/Distributor
  - Offset Generator
- RTP Receiver
- DTS Receiver
- LO Transmitter

# LO/IF Requirements

- IF Amplitude requirements
  - Bandpass slope <.3 dB across any 2MHz
  - Bandpass ripple <.25 dB pk to pk across any 2MHz

# LO/IF Requirements

- IF Phase Requirements
  - Phase Fluctuations <0.6 degrees rms baseline to baseline for any 2 MHz
  - Delay error < 2.8 ns for any 2 MHz

# LO/IF Requirements

- IF Phase Stability Requirements
  - Short Term <.5ps rms for times <1s .7 ° @4GHz
  - Long Term <6ps linear slope over 30min 8.6° @4GHz
- IF Phase shift with pointing change
  - <.7ps across whole sky
  - <.07ps per degree of slew

* specs apply after any RTP correction

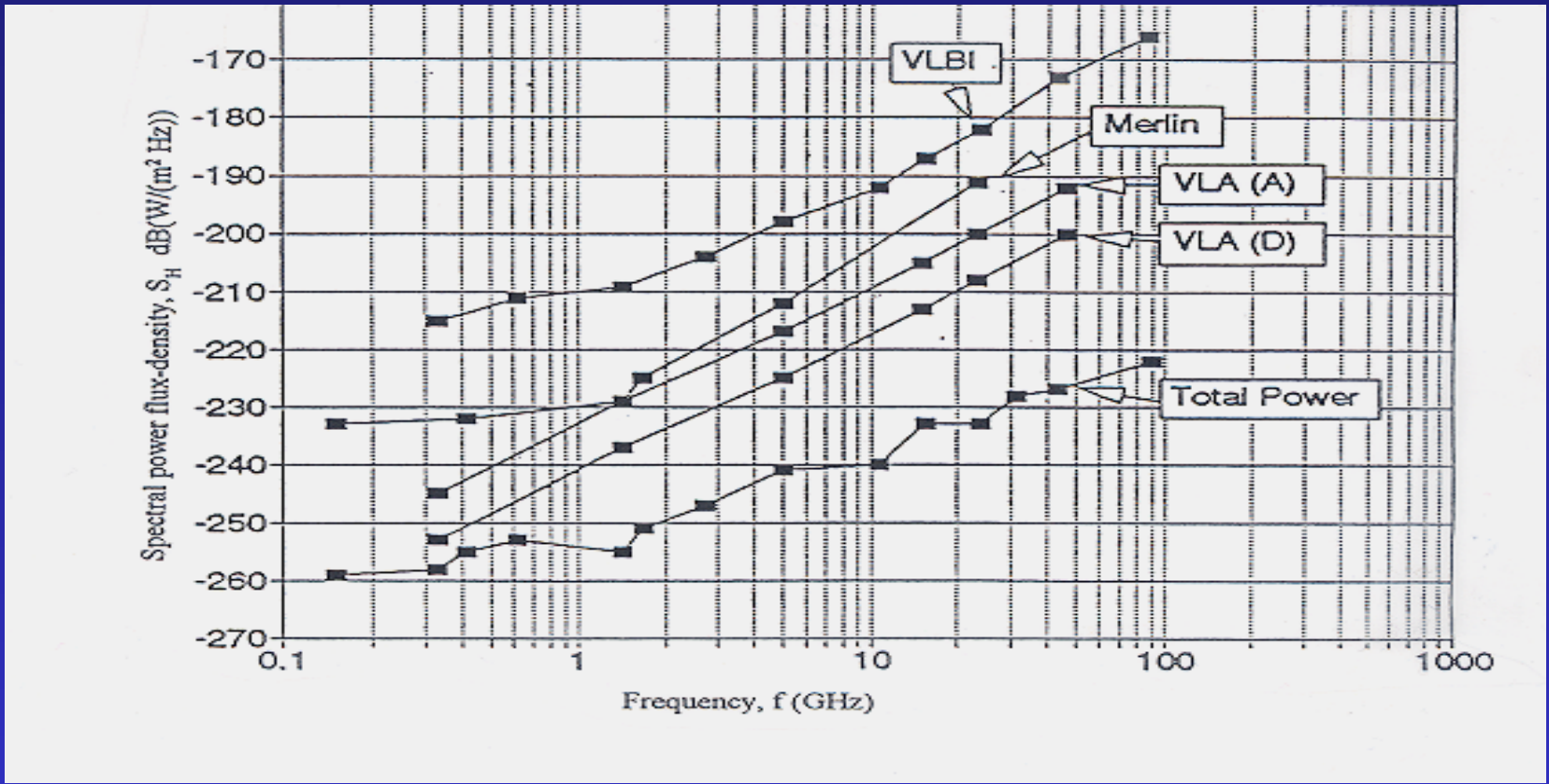
# Design Requirements

- Reuse same BIN hardware (goal)
- Reuse same racks except for samplers
- Reuse B-rack shield (goal)
- Use different module hardware
  - Current hardware is not RFI tight
  - OMQ connectors no longer available

# Design Requirements

- OSP Connectors for freq<22GHz
- Max pin usage for initial design on interface connector 80%
- Improved mean time between failure
- Samplers in separate shielded rack

# RFI Requirements per ITU



# 1st LO Requirements

| Freq GHz | Sub 1st LO GHz | Sub 1st IF GHz | 1st LO GHz | 1st IF GHz |
|---|---|---|---|---|
| .074 | 1.024 | 1.098 | 13 | 11.902 |
| .327 | 1.024 | 1.351 | 13 | 11.649 |
| 1-2/ 1.3-1.8 | | | 13 | 12-11 11.7-11.2 |
| 2-4 | | | 13 | 11-9 |

# 1st LO Requirements

| Freq GHz | 1st LO GHz | 1st IF GHz |
|---|---|---|
| 4-8 | 16 | 12-8 |
| 4.5-5.0 | 16 | 11.5-11.0 |
| 8-12 | None | 8-12 |
| 8-8.8 | None | 8-8.8 |
| 12-18 | 12x2,13x2 | 12-8 |
| 14.5-15.4 | 12.5x2 | 10.5-9.6 |

# 1st LO Requirements

| Freq GHz | 1st LO GHz | 1st IF GHz |
|---|---|---|
| 18-26 | 15x2,16x2<br>17x2,18x2 | 12-8 |
| 22-24 | 16.5x2 | 11-9 |
| 26-40 | 12x3 to 16x3 | 12-8 |
| 40-50 | 16x3 to 20x3 | 12-8 |

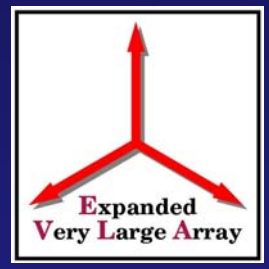
# 2nd LO Requirements

| 1st IF | 2nd LO | 2nd IF | 3rdLO | 3rd IF |
|---|---|---|---|---|
| 11.902 | 14.59 | 2.688 | 4.096 | 1.408 |
| 11.649 | 14.337 | 2.688 | 4.096 | 1.408 |
| 12-11 | 14.096 | 2.096 to 3.096 | 4.096 | 2-1 |
| 11.7-11.2 | 13.824 to 14.388 | 2.688-2.624 | 4.096 | 1.408-1.472 |
| 11-9 | 13 | 2-4 | | |

# 2nd LO Requirements

| 1st IF GHz | 2nd LO GHz | 2nd IF GHz | 3rd LO GHz | 3rd IF GHz |
|---|---|---|---|---|
| 12 to 8 | 10.624 to 14.688 | 2.688 to 2.624 | 4.096 | 1.408 to 1.472 |
| 12 to 8 | 12, 14 | 4 to 2 | | |


# Summary




The LO/IF group is working very hard to ensure that all specifications are met and that the Observatory's science goal will be achieved.

Please feel free to come and discuss any requirements with us at any time.