4.8.5.4 Radiometer Local and Remote M&C Interface

The radiometer status and commanding is through LAN TCP/IP. The remote interface protocol is defined in SED Radiometer DS3 Radiometer ICD 129220. Remote and local control parameters include:

- Local/Remote toggle switch (local control only)
- Initiate immediate NTMs according to selected signal band/pol/feed
- View results for NTMs on the front panel display or read results remotely
- TPR calibration measurements
- Multiple scheduled NTMs (remote only) and results
- View and set all ENR and noise diode path calibration values for the noise diodes and TPR calibration constants (local only)
- Review and clear the alarm log

The DS3 radiometer's remote interface is backwards compatible with DSA2 radiometer. A DS3 version radiometer can be used in Cebreros if configured for X-band Rx and Ka-band Rx only. The differences in the interface are as follows :

- Control commands to the DS3 radiometer now accommodate the selection of more IF inputs
- Monitor messages report the status of additional noise diodes if configured to do so
- Monitoring and control by multiple clients is also supported (as many as 3 clients simultaneously)

4.8.6 Pointing Calibration Sources for DS3

SED has identified potential calibrators suitable for use in the DS3 PCS. At this time 172 candidates have been identified. The calibration sources are listed in Table 4-33 Preliminary List of DS3 Position Calibrators.

Figure 4-79 shows the distribution of these radio sources as a function of RA and declination.

Sources from DSA2 with declination less than +45 deg are included since they will rise above the horizon at Malargue with a minimum of 10 degrees elevation. Additional new sources have been identified with declinations as low as –81 deg (the lowest one identified) to allow calibration up to 90 deg elevation at DS3 and good pole region coverage.

The PCS will use radio sources that are small in angular extent, have a well defined position, have negligible motion in RA and Dec, and have a catalogue flux density greater than about 0.75 Jy. (note that the catalogue flux and the actual flux can be quite different). During on-site integration tests, specific sources will be tested with the PCS. Those that are not suitable for pointing error measurements will be removed from the PCS database.

The additional sources were chosen from the ***Parkes Radio Sources Catalogue*** (PKSCAT90) (Wright+ 1990) (http://vizier.u-strasbg.fr/viz-bin/VizieR?-source=VIII/15). Pointing calibrators will be selected to have very small angular sizes, so typically quasars, BL Lacertae galaxies and N-type galaxies are used. It should be noted that all radio sources of this nature are variable in their intensity by a factor of likely 10 times in signal strength since their energy source is the ingestion of discrete lumps of matter into black holes for "short" periods (months or years) and not typically steady-streaming matter.

A second set of enlarged angular sources were chosen for their stability. These sources are typically supernova remnants (SNR). Since the source energy is produced by synchronous processes (electrons spiralling in magnetic fields), the sources are stable over millennia. However, these sources are extended in angular dimension. These sources are included in the list of G/T calibrators (refer to Section 4.8.7).

Typically, survey objects extend only into X-band as is the case for the Parkes catalogue. Sources chosen to cover the entire sky are as best as possible. Parkes calibrators are selected according to their flux at X-band and it is likely that the flux is less for each calibrator at Ka-band. As found for DSA2, there will be fewer suitable calibrators for Ka-band. The PCS database includes flux values for both X-band, Ka-band and now K-band for each calibrator. Therefore, when scheduling calibration measurements at a minimum flux density, the X-band, Ka-band or K-band calibrators that are selected by the PCS will be optimum for the band under test. Sources in crowded radio areas and double sources were excluded.

The list presented in the following table represents a preliminary extension of the VLA Calibrator Catalogue to extend useful calibrators south of where VLA catalogue ends.

Table 4-33 Preliminary List of DS3 Position Calibrators

Jname	Alias	RAJ2000 (h:m:s)	Dec J2000 (d m s)	Xflux (Jy)	Ka Flux (Jy)
0108+015	JVAS J0108+0135	01h08m38.771074s	01d35'00.317140"	2.05	2.4
0204+152	JVAS J0204+1514	02h04m50.413904s	15d14'11.043460"	2.32	1.7
0237+288	4C 28.07	02h37m52.405678s	28d48'08.990080"	4.65	2.1
0319+415	3C84 Perseus A NGC 1275	03h19m48.160102s	41d30'42.103050"	21.7	16.4
Fornax A	NGC 1316	03h22m41.5s	-37d12'33"	-1	
0339-017	NVSS J033930-014634	03h39m30.937787s	-01d46'35.803990"	2.08	2.4
0348-278		03h48m38.144561s	27d49'13.565300"	1.78	1.8
0403-360	1RXS J040353.1-360448	04h03m53.749908s	-36d05'01.913200"	3.9	3.5
0433+053	3C120 JVAS J0433+0521	04h33m11.095535s	05d21'15.619420"	3.3	2.8
0437+296	3C123	04h37m04.3750s	29d40'13.820"	10.1	
0501-019	4C-02.19	05h01m12.809888s	-01d59'14.256200"	3.7	3.1
0532+075	AS J0532+0732	05h32m38.998531s	07d32'43.345860"	2.08	3.2
0555+398	JVAS J0555+398	05h55m30.805608s	39d48'49.165000"	6.2	2.7
0607-085	QSO J0607-085	06h07m59.699243s	-08d34'49.978150"	3.22	2.9
0609-157		06h09m40.949538s	15d42'40.672640"	9.2	7.6
0646+448	NVSS J064632+445116	06h46m32.025985s	44d51'16.590130"	2.2	2.4
0730-116	QSO B0727-115	07h30m19.112472s	-11d41'12.600480"	3.97	2.4