Estella 1+1 Redundancy Solution
Fully Protected Core, Modulator and NMS with Hitless Switchover

In the 1+1 configuration, Estella Cores, Modulators and NMS nodes are backed up by at least one dedicated standby unit each. Fault detection and switchover is dynamic and automatic. The simplest form of redundancy is 1+1 architecture which delivers hitless protection — no terminal log-off — with minimal hardware and operational complexity.

1+1 REDUNDANCY (Modulator, Estella Core, and NMS)

Modulator (1+1)

ACTION: Primary and Standby modulator are configured identically by the NMS. Baseband and signaling traffic are sent to both modulators (port mirrored) by the Packet Handling System (PHS). Both modulators are connected to an RF switch which switches the output to the corresponding modulator upon alarm and failure detection. RF switch and modulator status are polled and shown on the NMS redundancy widget. The Estella Core is unaffected.

IMPACT: No Estella Core impact; MAC table update required for Modulator (no MAC announcement).

Estella Core (1+1)

ACTION: Primary and Standby Estella Core (NCC/PHS/MCD) are synchronized so that both share exact configurations and data history. The two Estella's check each others health and also use VRRP to protect host-level reachability. On Core failure, the Standby's Estella Core takes over the NCC and PHS activities. The Modulators of the failed core stay intact and simply receive traffic from the new PHS.

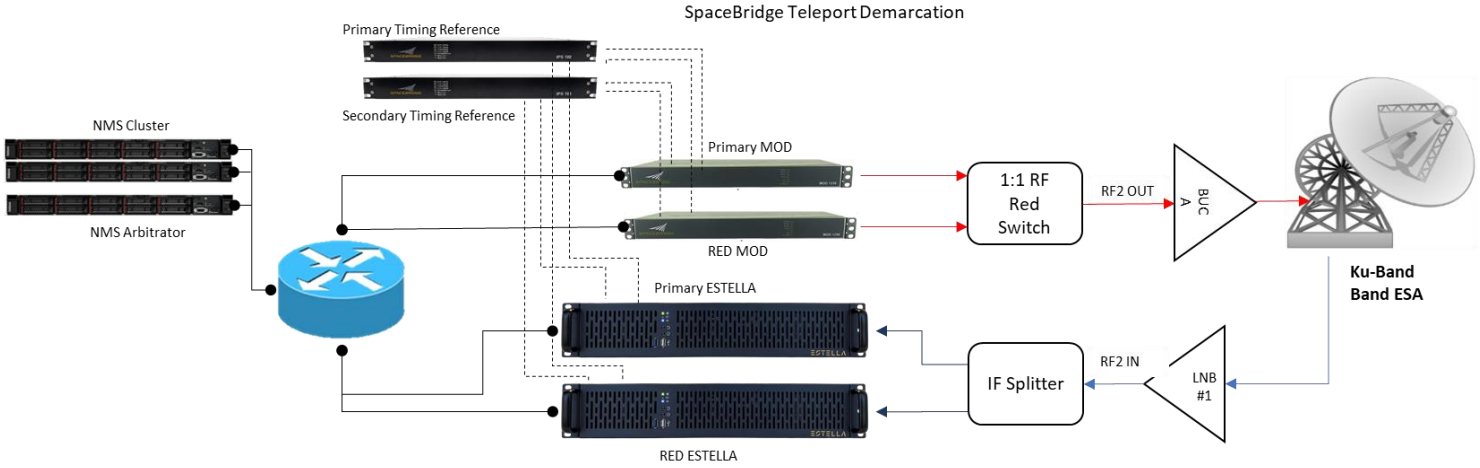
IMPACT: Brief signalling interruption during reconfiguration; terminals re-acquire without full log-off in the final design

NMS (1+1, clustered)

ACTION: NMS redundancy is delivered as a small cluster (NMS-1 + NMS-2 with an Arbitrator) with InfluxDB replication, so the 1+1 Estella/Modulator pair is always monitored and controllable even if one NMS node is down. The NMS defines both Core and Modulator as hub equipment and reports their status for switchover decisions.

IMPACT: No loss of monitoring or switchover control over the 1+1 pair.

1+1 Architecture



1+1 Component Specifications

Component	1+1 Behavior	Key Specifications
Estella Core (NCC/PHS/MCD)	Primary Core backed by one Standby Core; Standby assumes exact configuration on failure.	190 MHz MCD, up to 800 carriers · up to 8 Modulators per core · VRRP host redundancy
Modulator (MOD1250/FLS-220x)	One Primary Modulator backed by one Standby Modulator via automatic RF switch.	MOD1250/FLS-220x: PCR insertion & restamping supported
NMS	Redundant NMS cluster (NMS-1/NMS-2 + Arbitrator) monitors and controls the 1+1 pair.	Chain online-status widget · switchover/switch-back API & UI · InfluxDB replication