**RAN Distributed Unit (DU) cell site issues** and corresponding **remediation actions** that can be taken. These cover physical, configuration, and performance-related issues in the DU or its associated cells.

### **1. Issue: High PRB (Physical Resource Block) Utilization**

* **Symptom**: Users experience poor throughput during busy hours.
* **Cause**: Too many users or services requiring high bandwidth on the same cell.
* **Remediation**:  
  + Add a new carrier or frequency layer (e.g., LTE 2100 or NR n78).
  + Rebalance load across neighboring cells using **Mobility Load Balancing (MLB)**.
  + Enable **MIMO optimization** (e.g., 4x4 or 8x8).
  + Tune scheduling parameters like **scheduler fairness or QoS weighting**.

### **2. Issue: Poor Uplink SINR**

* **Symptom**: Poor voice quality or high uplink BLER (Block Error Rate).
* **Cause**: Interference from nearby cells or poor user device coverage.
* **Remediation**:  
  + Adjust **UL power control** parameters (e.g., increase target SINR or P0).
  + Apply **UL interference mitigation features** (UL CoMP, ICIC).
  + Check for faulty antennas, PIM (Passive Intermodulation), or feeder issues.

### **3. Issue: Excessive RRC Connection Drops**

* **Symptom**: Users frequently lose connection or fail to reestablish.
* **Cause**: Core interface issues, radio coverage holes, or timer mismatches.
* **Remediation**:  
  + Check and optimize **RRC timers (T310, N310, N311)**.
  + Verify **Xn/S1 interface stability** and congestion.
  + Optimize **handover thresholds** and ensure no coverage gaps.

### **4. Issue: Cell Not Broadcasting / Down**

* **Symptom**: Cell not visible or accessible to UEs.
* **Cause**: Configuration error, hardware failure, or DU miscommunication.
* **Remediation**:  
  + Check cell configuration (PCI, EARFCN/NRARFCN, SSB offset).
  + Ensure DU is connected to CU and has correct IP and VLAN settings.
  + Restart DU process or replace faulty radio unit (RU).

### **5. Issue: High Interference in Downlink**

* **Symptom**: Low DL throughput and high DL BLER.
* **Cause**: PCI collisions/confusion, overshooting cells, or antenna misalignment.
* **Remediation**:  
  + Perform PCI re-planning and eliminate collisions/confusions.
  + Adjust antenna downtilt or power to reduce overshooting.
  + Enable **DL ICIC or beamforming features** to reduce interference footprint.

### **6. Issue: Uneven Load Between Sectors**

* **Symptom**: One sector is congested while others are underutilized.
* **Cause**: Imbalanced antenna orientation or UE mobility patterns.
* **Remediation**:  
  + Modify **antenna azimuth/downtilt** to redistribute traffic.
  + Use **Load Balancing Features** (e.g., A3/A5 offset tuning for HO).
  + Tune **Cell Individual Offsets (CIO)** for better distribution.

### **7. Issue: Inconsistent DU-CU Communication**

* **Symptom**: Cell sites fail to attach to CU; control plane fails.
* **Cause**: IP/MPLS misconfiguration, firewall blocks, or CU resource overload.
* **Remediation**:  
  + Verify **IPsec/MPLS tunnels** and correct routing entries.
  + Confirm DU has correct CU IP and VLAN ID.
  + Balance DU assignment across available CU instances.
* Randomly apply anomalies to a small % of rows (e.g., 5–10%)
* Types of anomalies:  
  + High PRB Utilization (>95%)
  + Very low RSRP (e.g., <-110 dBm)
  + SINR degradation (e.g., <0 dB)
  + Sudden throughput drop
  + Active UEs spike/drop
  + Cell outage (zeroed values)

### **🧪 Anomalies You'll See:**

* **High PRB**: Overloaded capacity
* **Low SINR / RSRP**: Bad radio conditions
* **Low Throughput**: Network/data issue
* **UE spike**: Sudden UE storm or test scenario
* **Cell down**: Outage – all zeroed or placeholder values