

| Level | Scenario | Configuration | Explanation |
|-------|-------------------------------|--------------------------------------|---|
| 4 | Single Call Handling | $c_2, f = 2$ | The elevator is initially at Level 2 ($f = 2$), and a car call request is made at Level 2 (c_2), meaning a passenger inside the elevator requests to go to another level. The direction is not yet determined (DIR=NA). |
| 4 | Unreachable Level | $l_3^u, f = 2$ | The elevator is at Level 2 ($f = 2$), and there is an up request at Level 3 (l_3^u). However, the elevator is currently moving down (DIR=DOWN), meaning it cannot service the up request at Level 3 immediately. |
| 10 | Multi Call Handling | $l_0^u, l_3^d, f = 5$ | The elevator is at Level 5 ($f = 5$), with a landing call at Level 0 (up) (l_0^u) and another landing call at Level 3 (down) (l_3^d). The elevator is currently moving up (DIR=UP), meaning it must decide how to prioritize these requests. |
| 10 | Direction Switching Test | $l_5^u, l_8^d, f = 6$ | The elevator is at Level 6 ($f = 6$), with a landing call at Level 5 (up) (l_5^u) and another landing call at Level 8 (down) (l_8^d). Since it is moving down (DIR=DOWN), it must determine when and how to switch direction to accommodate the requests. |
| 15 | Conflict Request Handling | $l_2^d, l_5^u, f = 4$ | The elevator is at Level 4 ($f = 4$), with a downward request at Level 2 (l_2^d) and an upward request at Level 5 (l_5^u). The elevator is currently moving up (DIR=UP), creating a conflict in direction prioritization. |
| 15 | Idle Mode Test | $c_8, f = 10$ | The elevator is idle at Level 10 ($f = 10$, DIR=NA), and a car call request at Level 8 (c_8) is made. This tests how the system handles requests when the elevator is not in motion. |
| 20 | High-Level Request Simulation | $c_{10}, c_{15}, c_{18}, f = 12$ | The elevator is at Level 12 ($f = 12$), with car calls from Levels 10, 15, and 18 (c_{10}, c_{15}, c_{18}). The direction alternates between UP and DOWN (DIR=UP/DOWN), testing the system's ability to schedule requests across multiple levels. |
| 20 | Invalid Path Detection | $l_{18}^u, f = 19$ | The elevator is at Level 19 ($f = 19$), and there is a landing call at Level 18 (up) (l_{18}^u). However, since the elevator is moving down (DIR=DOWN), it cannot immediately serve this request. |
| 30 | Stress Test | $i \in [10, 30], c_i, l_i^u, f = 15$ | The elevator is at Level 15 ($f = 15$), with random car and landing calls across Levels 10 to 30 ($i \in [10, 30]$). The direction fluctuates between UP and DOWN (DIR=UP/DOWN), testing the system's handling of high-traffic situations. |
| 30 | Failure to Switch Direction | $l_{25}^u, l_{28}^d, f = 26$ | The elevator is at Level 26 ($f = 26$), with up and down requests at Levels 25 and 28 (l_{25}^u, l_{28}^d). The direction is not determined (DIR=NA), testing cases where the elevator fails to switch direction properly. |
| 30 | Scheduling Anomaly | $c_{10}, c_{20}, c_{25}, f = 22$ | The elevator is at Level 22 ($f = 22$), with car call requests at Levels 10, 20, and 25 (c_{10}, c_{20}, c_{25}). The direction fluctuates between UP and DOWN (DIR=UP/DOWN), testing for potential anomalies or incorrect scheduling behaviors. |

Table 1: Explanation of Multi-Level Elevator Scheduling Test Scenarios