Network Change Management

**Network Operations Centre**

Summit Communications Ltd.

Description: Description: logo

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1. Introduction

The Change Management document outlines the operating policies for the Network change request (NCR), approval and follows up of any kind of planned/emergency changes or maintenance works in the live part of Networks. Raising a Network change request (NCR) before any planned or maintenance work enable NOC (Network Operation Center) to coordinate and control before and after execution of planned works. NCR also enables NOC to filter out alarm related to the planned work or maintenance work and concentrate on the real issues. This also keeps update the concerned team in the organization about the impact being carried out for those maintenance activities.

1. Purpose

* To ensure that *all activities* that will be performed in the SCL live network are *well planned* with impact or risk factor analysis, risk mitigation plan and fallback plan.
* To ensure that *all planned activities* performed in the SCL live network are controlled and coordinated by proper assessment and conflict management in order to satisfy the network quality and availability.
* To ensure that *all planned activities* performed in the SCL live network are according to the proper guidelines and procedures.
* To ensure that all *planned activities* performed in the SCL live network are accomplished within the proper maintenance window.
* Keeping the impact or outage due to the planned activities in super off-peak hour (maximum impact in minimum traffic).
* To ensure that all relevant and affected parties agree in all planned Changes and are well informed about approved activities that will be carried out in the network.



1. Scope

* This procedure will be based upon instructions from the Technology Management.
* This procedure is controlled & approved by NOC.

* This document will be used by Operations & Maintenance (O&M), Implementation, Central Operations support(COS),UG Operations, Gateway Operations, Power & Projects(P&P), IT to generate Network Change request(NCR) before any planned or emergency work.
* This procedure will be applied to activities and severities defined as Critical, Major and Minor Changes and both for Regular and Emergency cases.
* This procedure will also define the timing/windows for performing the maintenance activities based on its severity and impact.
* This document will outline the approval process and hierarchy based on change type.
* This document will contain some guidelines and procedures to maintain for managing change request (quantity and lead time)
* This procedure will be followed up through NCR Tool and mail.

**Following conditions apply for Network Change Request (NCR):**

* NCR will be raised from different department for any kind of change in the live network.
* In general NCR will be raised for any work done in the live network regardless of whether that results in outage or performance degradation or service unavailability or have any potential risk of outage.

1. Classification of Changes

a). Planned Changes

This kind of Changes will use all planned activities described in the process to implement the Change in the live network (in normal cases)

* + 1. Critical
    2. Major
    3. Minor

b). Emergency Changes (With minimum approval time)

Changes that must be carried out as soon as possible to prevent outage situation or to support business requirements due to Consequence of Fault Handling, Legal Order, Management Order, Environmental Issue or Other Emergency Situation.

In these cases the time for implementation is crucial. Emergency change request approval hierarchy will be followed to minimize the approval time. Requestor may need to clarify through mail to get approval in the fastest way. As emergency and the changes required on urgent basis, in this scenario the approval may come through e-mail/any written format (i.e. after normal office hour).

1. Change Categories

This section defines the different Change categories and explains criteria for each Change category.

Definition of categories and criteria

The main Change categories are listed below:

* Critical Change
* Major Change
* Minor Change

Critical Change

A Critical Change is a change with high risk and high impact in operational services & normally conducted in night window that need to go through assessment, authorization, approval and scheduling before implementation.

**Criteria:**

* Risk of high impact(Backbone/Device redundancy lost)
* Planned outage with high impact
* Involvement of multiple stakeholders with high business risk.

Major Change

A Major Change is a change with risk of medium impact in operational services & that need to go through assessment, authorization and scheduling before implementation.

**Criteria:**

* High risk and medium impact
* Planned outage with medium impact

Minor Change

A Minor Change is a change with low risk and low impact or no risk and no impact, relatively common and need to be conducted in a regular manner.

**Criteria:**

* Low risk and low impact
* Very low or no risk and impact
* Routine Activity

**Severity matrix of Change**

**Operations & Maintenance:**

|  |  |  |
| --- | --- | --- |
| **Type** | **Change class** | **Example** |
| **Critical** | Capacity Up gradation | Upgrading service capacity. |
| Ring Modification | Straight Joint & SPOFing/ Site Separation from ring due to client issue. |
| New site inclusion | Newly handed over site by I&C in an existing ring as necessary logical shifting is done by O&M |
| Core device (Fan) rectification | To reduce device temperature and to perform PM activity. |
| Core device (Faulty Card or XFP) Changing activity | Link down/ High RSL at Backbone/access link due to Card/SFP fault maintenance. |
| Access device (Faulty Card or SFP) Changing activity | Link down/ High RSL due to Card/SFP fault maintenance. |
| Power source rectification activity | Site down/ unprotected due to both/single power source respectively. |
| Backbone link rectification | High RSL/ BB link down issue. |
| Client port shifting activity | Faulty port change. |
| GE shifting activity | To ensure location level redundancy at HO GE. |
| Device shifting activity | Swapping |
| Link rectification (High loss) | Packet loss, high latency, DCH Frame loss rectification. |
| Government/Other Authority’s Plan Activity | Road Expansion, Transformer shifting, pole shifting |
| Drill test activity | Test the protection status of access and aggregate devices. |
| ODF rearranging or shifting activity | Repositioning ODF/ implementing new ODF for better performance. |
| GE Redundancy Check | Test the protection status of handover GE for Robi. |
| Power Device Trouble Shooting |  |

|  |  |  |
| --- | --- | --- |
| **Type** | **Change class** | **Example** |
| **Major** | Device Unreachable (Logical problem activity) | Need physical rectification and sometimes reboot. |
| Joint visit activity with client | Service troubleshooting of client. |
| Link rectification (re-route) | Cable latching/ changing cable laying path for better performance. |
| Core device capacity up gradation activity | Increasing device capacity by new high capacity device or Increasing Backbone link capacity. |
| Core Device (card) up gradation | Increasing device capacity by new card or Increasing Backbone link capacity. |
| Underground (POC) shifting activity | UG Network standardization to ensure less downtime. |
| Device Firmware Up gradation | Upgrading logical OS for better performance. Device takes reboot while up gradation. |
| Government cable cut (De-cluttering) activity | Links get down due to De-cluttering |
| Data center Standardization | Device relocation/ Patch cord re-arrangement activity. |
| Client port shifting activity | Changing client port for capacity up gradation. |
| Backbone link rectification | High RSL/ BB link capacity up gradation. |
| Site Relocation | Relocating within a new building to a new room. |
| Site Reposition | Reposition site to a new building/ logical repositioning. |
| Preventive Maintenance | Preventive activity to ensure better uptime/ performance. |
| Power Redundancy Check | To ensure redundant power source for sites. |
| Power Device Up gradation |  |
| **Minor** |  |  |
|  |  |
| **Emergency** | Any kind of network & service impact may happen. Based on impact it will be Emergency. | |

Power & Project:

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| --- | --- | --- |
| **Type** | **Change class** | **Example** |
| Critical | SPD Change | Suppose due to any abnormality of commercial power SPD of SRF system/MDB/Rectifier system got burnt and needed to be replaced on emergency basis. |
| Circuit breaker replacement | Due to sudden increase in load demand a circuit breaker can be tripping simultaneously or due to any short circuit at the load end and it needed to be changed immediately. |
| MDB Replacement | Sometimes the whole MDB can got burnt due to accidental phenomenon in power lines and it is needed to be replaced. |
| Rectifier / Inverter module replace | Due to increasing secondary harmonic transients in commercial power line existing rectifier/inverter modules can be damaged and they are needed to be changed. |
| Battery cell change | one or more battery cells can show degrading performance in the overall battery bank and it can affect the backup during commercial failure and they are in need to be replaced with new ones. |
| Battery Bank Replacement | To maintain the standard back up time during commercial failure we may be required to replace the existing battery banks with upgraded battery systems. |
| Major | SRF System Replace | Sometimes SRF systems can be damaged due to huge surge of transmission line and it needed to be replaced |
| Aircon maintenance / replacement | However existing devices in our PoP room can show temperature abnormalities due to degrading performance of aircon and it is needed to be replaced or immediate maintenance are required. |
| Rectifier system up gradation | Because of increasing load demand and to facilitate our networking equipment’s we may replace the old rectifier systems in a PoP with new and upgraded system with higher capacity. |
| Inverter system up gradation | Because of increasing load demand and to facilitate our networking equipment’s we may replace the old inverter systems in a PoP with new and upgraded system with higher capacity. |
| Power system shifting | For relocation of power system devices in different room/location according to Management Decision. |
| Diesel genset replacement | As most of our core sites and all of our data centers are under the backup of diesel generators, sometimes these generators are in need in capacity up gradation and needed to be replaced with new one |
| Power duality of device checking | Often we need to check for vital networking equipment’s of SCL network that dual power is ensured to them and in case of failure of active power the redundant power can work accordingly |
| AVR & Bypass system installation | To increase the power system protection of the network we required to install AVR with bypass system. |

Gateway Operations:

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| --- | --- | --- |
| **Type** | **Change class** | **Example** |
| **Critical** | Routers & Switches & Servers & MUX Devices Unreachable but traffic not hampered | For some internal Management Network issue, Devices may be unreachable. If need to reboot Device. |
| Client Port Shifting as fault port | Suppose, Client's traffic running but they are facing trouble and after Troubleshooting found Port problem. That time need to change port. |
| Routers, MGW, SS & MUX devices Card faulty | Sometimes without any previous alarm device's Card goes Faulty position, need to change Card. That time Clients service will be hampered with connected Faulty Card. So instantly need to change Faulty Card. |
| Upstream Shifting | Suppose one of our Most capacity goes down but there have an option for increase same capacity of our other location device. But for doing this we need to increase P2P capacity on new device. For this need to physically port connected and configure device. |
| Device/card Temperature increase | if any device's/card temperature increased and Card goes down, need to shift connected clients to another card or need to reboot problematic card or shift problematic card. |
| Device Failure ( Router, MGW, Switch & MUX ) | if any time devices goes down and not power on automatically, need to change device & need to shift clients to new installed device & need to reconfigure for all connected clients. |
| **Major** | Routers & Switches & Servers & MUX Devices Unreachable but traffic not hampered | Traffic is not hampering but need to check device for accessibility for monitoring device. |
| Client Port Shifting as fault port | If found port is fault but if change this port within a day, no issue will be occurred. |
| Routers & MUX devices Card faulty | We are getting Card Faulty related alarms. Immediately need to change this faulty card. In this scenario we will change this card within a day. |
| Upstream Shifting | Need to change port from 1G/10G/STM16/STM64, but not need to change emergency. So we can change port within a day. |
| Device/card Temperature increase | Device Temperature is high but not critical that if need to change anything then we will change within a day. |
| Data Center Shifting | For relocate device in different location and accordingly to Management Decision may need to shift device from existing location to new location |
| Packet Loss problem | Clients are getting P2P Packet loss. There have no logical problem, for troubleshooting need to change port. During change port and check need to some down time. |
| P2P Link Capacity up gradation | If any user's BW consumption almost full, need to upgrade port from 1G to 2G or 10G port |
|  | Device (MGW, MUX, SS for ICX) Capacity Up gradation | For upgrading device capacity need to installation New Card/New Device |
| **Minor** | Routers & MUX devices Card faulty | Card are showing faulty but if we change within 1-2 day, there have no problem. |
| Device/Card Temperature increase | If it is caused by dust in device, for clearing dust need to take Maintenance Window. |
| Device (Router & MUX) Capacity Up gradation | For upgrading device capacity need to installation New Card/New Device |
| Cable rearrangement and infrastructural port connectivity | For change problematic cable or arrangement cable and port change for internal device connectivity. |
| **Emergency** | Any kind of network & service impact may happen. Based on impact it will be Emergency. | |

1. Approval Process & Authority

Approval level of Change Management Process is given by change category.

|  |  |  |  |
| --- | --- | --- | --- |
| **Change Type** | **First Approver** | **Interim approver** | **Final Approver** |
| Critical | Requester HOD | NOC>NOC Head | NOC head/CTO/CEO |
| Major | Requester HOD/Nominated concern of HOD | NOC>NOC Head/ Nominated concern of HOD | NOC Head |
| Minor | Nominated concern of HOD | NOC | NOC |
| \* Emergency(Depends on impact) | Requester HOD/Nominated concern of HOD | NOC>NOC Head/ Nominated concern of HOD | NOC Head(High impact)/Nominated concern of HOD |

\*For Emergency case, approval process depends on impact/number of customers.

**Planned work severity matrix, NCR lead-time, approval lead-time:**

Requesters have to create NCR before schedule will be started as below.

|  |  |  |
| --- | --- | --- |
| **Severity** | **NCR Raising Lead Time** | **Comments** |
| Critical | 4 WD(by 12PM) | All NCR E2E approval via NCR tool should be completed by 72hrs before of the execution day |
| Major | 4 WD(by 12PM) |
| Minor | 4-6hrs before NCR activity |
| Emergency CR | 3hr (\* situation based) |

1. Request for Change (RFC) Process and Execution:
2. Requesters will raise NCR through NCR Tool mentioning team members/group or any other concern related to the NCR activity within SCL or outside SCL, if involved.
3. Requesters should maintain the NCR lead time and approval lead time for requesting a NCR, not maintaining proper time frame for planned work may result in the rejection of the NCR.
4. After raising in tool, first requester HOD/nominated concern will approve NCR then it will land in NOC.
5. NOC members will assess and analyze NCR according to severity matrix and if all relevant information is ok then Approve / forward for approval through NOC Tool according to the approval matrix and if all the information are not ok then NCR will be reverted back to the Requesters.
6. Critical and Major NCR will be forwarded to proper authorization body through NCR tool for approval and Minor NCR will be assessed and approved by NOC members.
7. After getting final approval from all authorized body NOC will notify all customer via system generated mail/SMS/tools.
8. After getting customer feedback, requester/concern internal body will be notified via sms/mail/tool confirming execution go call or reschedule requests.
9. Schedule for any planned work may change due to the confliction with other planned work (planned work with same traffic hampering pattern) or any ongoing fault in network.
10. Requesters may need to change the schedule and in that case the requesters will notify within the working hours with explanation to NOC.
11. Concerned requester will implement the change by informing NOC over phone before starting the planned work.
12. NOC will give reminder mail to all customer for starting execution i.e. Start Notification.
13. In case of any unusual consequences or time extension required during execution the engineer will update NOC immediately and NOC will notify to all customer as per notification process.
14. In case of failure concerned engineer will update NOC immediately and start fallback. After fallback concerned engineer will update NOC immediately.
15. After completion of the planned work either successful or failed the executioner will update the planned work status over phone and/or tool with actual impact and time.
16. After completion of activities executors will confirm the post checklist which is fixed for post analysis.
17. NOC will notify (post acknowledgement) concerned bodies/customers as End notification/status confirmation.
18. NOC will prepare report for weekly, monthly, quarterly, yearly, ad-hoc basis.

**Highlights of this NCR Process:**

1. Planned work with huge traffic volume impact and considering the outage duration (as per definition) will be treated as Critical planned work and no other activity on same platform will be allowed in that particular time period.
2. Not more than one critical planned work will be allowed in a particular night/date.
3. Not more than 10 (total) NCR per night/date.
4. For approval of NCR First Come First Serve Policy will be applied.
5. Fault Restoration Activity will get priority for execution approval.
6. If any conflict arises NOC will call all concerned stakeholders and will coordinate a meeting to take any decision.

|  |  |
| --- | --- |
| **Description** | **Allowed NCRs** |
| Max NCR at night | 10(Based on customer Impact) |
| Max Critical NCR | 1(Based on customer Impact) |

1. Change Request Mechanism (Tool)

There will be a tool for NCR approval/customer notification process.

1. Execution Time Frame (Operation Maintenance Window)

Operation maintenance windows are the period of time that is allowed to the executioners for the implementation of the planned work according to the severity of the planned work and traffic pattern of the service for the lowest effect to the valued customer.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Window Name** | **Execution Time** | **Outage Time** | **Client** | **Critical** | **Major** | **Minor** | **Remarks** |
| **Window-1** | 00:00 - 06:00 | 02:00 - 05:00 | GP | Yes | Yes | Yes | All types of planned work/maintenance activities which may lead service outage or may have high risk |
| 00:00 - 06:00 | All Others |
| **Window-2** | 06:00 - 12:00 | 06:00 - 09:00 | GP | No | No | Yes | Max 15 sites outage or risk of outage |
| 06:00 - 12:00 | All Others | Yes | Yes | Yes | This Window specially for PGCB Node activity |
| **Window-3** | 13:00 - 17:00 | 13:00 - 17:00 | All | No | No | Yes | Max 5 sites outage for GP and Max 8 sites for others client where risk of outage |
| **Window-4** | 18:00 - 22:00 | 18:00 - 22:00 | Non Telco | Yes | Yes | Yes | Only Non Telco service, specially data service affected planned activity |
| **Window-5** | 09:00 - 22:00 | 09:00 - 22:00 | SCL | No | No | Yes | Non Service affected planned activity |

Gateway Operation window while maintenance doing themselves:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Window Name** | **Execution Time** | **Outage Time** | **Critical** | **Major** | **Minor** | **Remarks** |
| Window-1 | 03:00 – 9:00 | 04:00 - 8:00 | Yes | Yes | Yes | All types of Planned Work/Maintenance activities which may lead outage or may have high risk. |
| Window-2 | 09:00- 13.00 | 09:00 - 12.00 | No | No | Yes | Maximum 5 client's active or protection link will be down. |
| Window-3 | 12:00 - 3:00 | 12:00 - 3:00 | No | No | Yes | non service affecting |
| Window-4 | 10:00 - 17:00 | 10:00-17:00 | No | No | Yes | FYI Activities (non service affecting) |
| Window-5 | 1-2 day | 1-2 day | Yes | Yes | Yes | Clients may be down if protection link is not available. |

1. Notification Process

NOC will notify pre and post acknowledgement for every planned work to concerned bodies/customers as per notification process below:

|  |  |  |  |
| --- | --- | --- | --- |
| **Stakeholders/ Customers** | **Change Type** | **Mode of Notification** | **Notification Time** |
| All Concerned Stakeholders of SCL | -Emergency  -Critical  -Major  -Minor | SMS/E-Mail | SMS: By 08:00 PM of the Change Day  Email: By Business hour. |
| Management | Emergency (impact based)  Critical | SMS | SMS: By 08:00 PM of the Change Day |
| Marketing | Subscriber’s Impact and any service interruption of customer. | Email | Email: By Business hour |
| All customers | If interruption of their connectivity | Email | Email: 3 WD prior to change |

1. Review Policy:

The change management process will go under review as per bellow policy and schedule.

* 1. The policy file will be updated annually.