

# Kalam Telecom Internet Service Provider

## Project Plan

Version 7.0

Date: 2/11/2025

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This report was submitted in fulfillment of the requirements for the **degree of Bachelor of Information and Communications Technology, Networking Major, Faculty of ICT, Bahrain Polytechnic, Kingdom of Bahrain, 2025**.

## Declaration

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person nor material which to a substantial extent has been accepted for the award of any other degree or diploma of the university or other institute of higher learning, except where due acknowledgment has been made in the text.

Signature      <Hasan>      Name      <Hasan Bahzad>      Date: 9/10/2025

# Document Change Control

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Table 1 Documentation Change Control

## Distribution List

This following list of people shall receive a copy of this document every time a new version of this document becomes available:

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Kalam Telecom - Sponsor

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Mohammed Zuhair – Tester

Ali Abdulla – Quality Assurance Specialist

Hussain Abdullhadi – Risk Officer

Oliver Smith – Project Analyst

## Change Summary

The following table details changes made between versions of this document

Version	Date	Modifier	Description
1.0	9/10/2025	Project Manager	Scoop Management: Add Problem Analysis Requirements gathering sections
2.0	12/10/2025	Project Manager	Adding the WBS
3.0	15/10/2025	Project Manager	Adding The Human resource Section
4.0	16/10/2025	Project Manager	Adding Time, Cost and Communication Sections
5.0	20/10/2025	Project Manager	Adding Quality, Risk Management
6.0	25/10/2025	Project Manager	Adding Procurement Management, Integration and closing phase
7.0	2/11/2025	Project Manager	Finalizing the Document

Table 2 Change Summary

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# Scope Management Plan

## Introduction

The main purpose of this Scope Management Plan is to define the scope of Kalam Telecom infrastructure. This document identifies all in-scope and out-of-scope points to ensure that the project includes the required work for the ISP Infrastructure, while preventing unnecessary work.

## Process

The scope process consists of 6 steps:

- Scope management plan
- Identifying problems and gathering information
- Define scope
- Creating work breakdown structure
- Scope validation
- Scope control

## Objectives

The main goal of this project scope management is:

- Identify the in-scope and out-scope
- Identify project deliverable
- Identify risks, constraints and assumption

## Roles and Responsibilities

The table below represents the RACI table which stands for Responsible, Accountable, Consulted and Informed. The table will showcase the tasks and the level responsibility of each member when developing the scope management plan.

Responsible	Accountable	Consulted	Informed
Project Manager, Project Analyst	Project Manager	Client, Supervisor	All stakeholders

Table 3 Scope Management RACI

## Approach

The suitable approach for this project is the in-scope and out-scope approach. This approach will define what are included in the project and what needs to be done and what are not included in the project also, incorporating the functional and non-functional requirements for better understanding to reduce confusion when working on the project. The following table will identify the in-scope as well as out-scope:

In-Scope	Out-Scope
<ul style="list-style-type: none"><li>• Implement MPLS on core network</li><li>• Implement multiple routing protocols BGP for external and OSPF/EIGRP for internal.</li><li>• Configure redundant paths and links.</li><li>• Deploying MPLS VPN</li><li>• Configuring QoS</li><li>• Implementing logging.</li><li>• Develop network topology diagram and IP address scheme</li><li>• Conducting testing</li></ul>	<ul style="list-style-type: none"><li>• Customer Equipment Configuration.</li><li>• Outdated equipment maintenance.</li><li>• Creating Billing systems or customer management platforms</li></ul>

Table 4 In-Scope & Out-of-Scope

## Scope Definition

Identifying a detailed description of scope is completed through multiple approaches and methods. These methods involve identifying the requirements for this project through different ways, first approach or method is the Ishikawa diagram, also known as the fishbone diagram. The Ishikawa diagram was used to help brainstorm and deep thinking of the main causes of the client problem. Second approach or method is to conduct an interview with the client to identify their needs and problems.

Furthermore, the project charter document was a great supporter of identifying the scope. This diagram helps to draw the vision of the client on the system in addition to providing a high-level description of the project scope, budget duration, success criteria and main objectives. Finally comparing and reviewing the other ISPs and similar development ISP projects helps since it gives us a little bit of advantages in defining the project scope and makes it more focused on the problem.

## Scope Statement

### Product Scope Description:

The product will solve the current issues of the client system as it will provide redundancy, security and interconnectivity alongside protocols such as NAT and PPP, in addition to AAA and VRF as security measures. The whole product component will be Validated before being deployed in a simulation environment and it will go through extensive monitoring and testing before being deployed in the real infrastructure.

### Product Acceptance Criteria:

The product will be considered as completed when the simulated environment of the infrastructure has met all the requirements, the functional and non-functional alongside the demonstration of redundancy and security and interconnectivity. In addition to the approval of all stakeholders.

### Project Deliverables:

- Network topology design
- Configuration files
- Detailed network diagrams and documentation

- Implementing network security services
- Configuring redundant links and paths
- Centralize logging system
- Implementing interconnectivity services for customers
- Simulated environment for the real topology

Project Exclusions:

- Configuring customer equipment
- Migrating the outdated devices
- Creating a billing system to track customers billing

Project Constraints:

- Budget limitation
- Project Timeline
- Delays in obtaining licenses for MPLS features
- Poor documenting during configuration

Project Assumptions:

- Current network infrastructure will be operational during the upgrade
- Equipment will be sourced from single vendors.
- All essential equipment from cables, etc will be available
- Funding will be available as planned

## Work Breakdown Structure

The figure below represents the overall time that the project takes alongside the process that the project goes through to achieve the deliverables.

Task Mode	Task Name	Duration	Start	Finish	Predecessors	Resource Names
➡	▫ Kalam Telecom Internet Service Provider	63.81 days	Wed 10/1/25	Mon 12/29/25		
✓	▫ 1 Initiate Phase	7 days	Wed 10/1/25	Thu 10/9/25		
✓	▫ 2 Planning Phase	18 days	Sun 10/12/25	Tue 11/4/25	1	
	▫ 3 Executing Phase	30.31 days	Wed 11/5/25	Wed 12/17/25	25	
	▫ 4 Monitor and control phase	4.5 days	Wed 12/17/25	Tue 12/23/25	148	
	▫ 5 Closing the project	4 days	Tue 12/23/25	Mon 12/29/25	159	

Figure 1 WBS – Project Overall Phases

The bellow figure displays the work breakdown structure of the initiate phase of the project with the project charter as the final milestone of this phase.

Task Mode	Task Name	Duration	Start	Finish	Predecessors	Resource Names
➡	▫ Kalam Telecom Internet Service Provider	63.81 days	Wed 10/1/25	Mon 12/29/25		
✓	▫ 1 Initiate Phase	7 days	Wed 10/1/25	Thu 10/9/25		
✓	▫ 1.1 Overview of the client	0.63 days	Wed 10/1/25	Wed 10/1/25		
✓	1.1.1 Stakeholders identification	1.5 hrs	Wed 10/1/25	Wed 10/1/25	Project Manager,Project Analyst	
✓	1.1.2 Client background	1 hr	Wed 10/1/25	Wed 10/1/25	3	Project Manager,Project Analyst
✓	1.1.3 Current systems	1 hr	Wed 10/1/25	Wed 10/1/25	4	Project Manager,Project Analyst
✓	1.1.4 Related procedures and policies	1.5 hrs	Wed 10/1/25	Wed 10/1/25	5	Project Manager,Project Analyst
✓	▫ 1.2 General information	1.31 days	Wed 10/1/25	Thu 10/2/25	2	
✓	1.2.1 Project purpose	3 hrs	Wed 10/1/25	Wed 10/1/25	Project Manager,Project Analyst	
✓	1.2.2 Project description	1.5 hrs	Thu 10/2/25	Thu 10/2/25	8	Project Manager,Project Analyst
✓	1.2.3 Schedule summary	2 hrs	Thu 10/2/25	Thu 10/2/25	9	Project Manager,Project Analyst
✓	1.2.4 Budget summary	2 hrs	Thu 10/2/25	Thu 10/2/25	10	Project Manager,Project Analyst
✓	1.2.5 Project success criteria	2 hrs	Thu 10/2/25	Thu 10/2/25	11	Project Manager,Project Analyst
✓	▫ 1.3 Project context	1.31 days	Thu 10/2/25	Mon 10/6/25	7	
✓	1.3.1 Business need, opportunity or problem	2 hrs	Thu 10/2/25	Sun 10/5/25	Project Manager,Project Analyst	
✓	1.3.2 Business objective	1 hr	Sun 10/5/25	Sun 10/5/25	14	Project Manager,Project Analyst
✓	1.3.3 Business assumption	2 hrs	Sun 10/5/25	Sun 10/5/25	15	Project Manager,Project Analyst
✓	1.3.4 Business constraints	3 hrs	Sun 10/5/25	Sun 10/5/25	16	Project Manager,Project Analyst
✓	1.3.5 Business risks	2.5 hrs	Sun 10/5/25	Mon 10/6/25	17	Project Manager,Project Analyst
✓	▫ 1.4 LESPI	1.5 days	Mon 10/6/25	Tue 10/7/25	13	
✓	1.4.1 Legal issues	3 hrs	Mon 10/6/25	Mon 10/6/25	Project Manager	
✓	1.4.2 Ethical issues	3 hrs	Mon 10/6/25	Mon 10/6/25	20	Project Manager
✓	1.4.3 Social issues	3 hrs	Tue 10/7/25	Tue 10/7/25	21	Project Manager
✓	1.4.4 Professional issues	3 hrs	Tue 10/7/25	Tue 10/7/25	22	Project Manager
✓	1.5 Project charter	0 days	Thu 10/9/25	Thu 10/9/25	19	Project Manager

Figure 2 WBS - Initiate Phase

The following figure presents the overview of the Planning phase work breakdown structure and the high-level tasks of this project with the Submission of project plan document as the milestone for this phase.

✓	💻	↳ 2 Planning Phase	18 days	Sun 10/12/25	Tue 11/4/25	1		
✓	💻	↳ 2.1 Scope Management	3.06 days	Sun 10/12/25	Wed 10/15/25			
✓	💻	↳ 2.2 Human Resource Management	0.75 days	Wed 10/15/25	Wed 10/15/25	26		
✓	💻	↳ 2.3 Schedule Management	1.69 days	Wed 10/15/25	Sun 10/19/25	47		
✓	💻	↳ 2.4 Cost Management	0.75 days	Sun 10/19/25	Mon 10/20/25	52		
✓	💻	↳ 2.5 Communication Management	0.56 days	Mon 10/20/25	Mon 10/20/25	59		
✓	💻	↳ 2.6 Procurement Management	0.38 days	Mon 10/20/25	Tue 10/21/25	64		
✓	💻	↳ 2.7 Quality Management	0.81 days	Tue 10/21/25	Tue 10/21/25	69		
✓	💻	↳ 2.8 Risk Management	1.38 days	Wed 10/22/25	Thu 10/23/25	73		
✓	💻	2.9 Submission of Project plan document	0 days	Tue 11/4/25	Tue 11/4/25	79	Project Manager	

Figure 3 WBS – Planning Phase Overview

The next figure represents the sub tasks of the scope management plan, and they are problem analysis, requirement gathering, plan scope management and decision analysis. In this phase the scope management submission is considered as the milestone.

✓	💻	↳ 2.1 Scope Management	3.06 days	Sun 10/12/25	Wed 10/15/25			
✓	💻	2.1.1 Problem Analysis - Ishikawa Diagram	3.5 hrs	Sun 10/12/25	Sun 10/12/25		Project Analyst	
✓	💻	↳ 2.1.2 Requirements Gathering	0.5 days	Sun 10/12/25	Sun 10/12/25	27		
✓	💻	2.1.2.1 Interview Plan	1 hr	Sun 10/12/25	Sun 10/12/25		Project Manager	
✓	💻	2.1.2.2 Functional requirements identification	1 hr	Sun 10/12/25	Sun 10/12/25	29	Project Analyst	
✓	💻	2.1.2.3 Non-Functional requirements identification	1 hr	Sun 10/12/25	Sun 10/12/25	30	Project Analyst	
✓	💻	2.1.2.4 Design requirements identification	1 hr	Sun 10/12/25	Sun 10/12/25	31	Project Analyst	
✓	💻	↳ 2.1.3 Plan Scope management	0.81 days	Sun 10/12/25	Mon 10/13/25	28		
✓	💻	2.1.3.1 Scope Introduction	0.5 hrs	Sun 10/12/25	Sun 10/12/25		Project Manager	
✓	💻	2.1.3.2 Scope definition	0.5 hrs	Mon 10/13/25	Mon 10/13/25	34	Project Manager	
✓	💻	2.1.3.4 Scope statement	0.5 hrs	Mon 10/13/25	Mon 10/13/25	35	Project Manager	
✓	💻	2.1.3.5 Scope verification	0.5 hrs	Mon 10/13/25	Mon 10/13/25	36	Project Manager	
✓	💻	2.1.3.6 Scope control	0.5 hrs	Mon 10/13/25	Mon 10/13/25	37	Project Manager	
✓	💻	2.1.3.7 Work breakdown structure	0.5 days	Mon 10/13/25	Mon 10/13/25	38	Project Manager	
✓	💻	↳ 2.1.4 Decision analysis	1.31 days	Mon 10/13/25	Wed 10/15/25	33		
✓	💻	2.1.4.1 COTS matrix	4 hrs	Mon 10/13/25	Tue 10/14/25		Project Analyst	
✓	💻	2.1.4.2 COTS weighted matrix	2.5 hrs	Tue 10/14/25	Tue 10/14/25	41	Project Analyst	
✓	💻	2.1.4.3 Resource sheet (Entry view)	1 hr	Tue 10/14/25	Tue 10/14/25	42	Project Analyst	
✓	💻	2.1.4.4 Resource sheet (Cost view)	1 hr	Tue 10/14/25	Tue 10/14/25	43	Project Analyst	
✓	💻	2.1.4.5 Cost benefit analysis	2 hrs	Tue 10/14/25	Wed 10/15/25	44	Project Analyst	
✓	💻	2.1.5 Scope management submission	0 days	Wed 10/15/25	Wed 10/15/25	40	Project Manager	

Figure 4 WBS - Scope Management

The below figure represents the human resource management plan, The submission of the human resource management considered as a milestone for the sub-phase.

<input checked="" type="checkbox"/>		↳ 2.2 Human Resource Management	0.75 days	Wed 10/15/25	Wed 10/15/25	26		
<input checked="" type="checkbox"/>		2.2.1 Set responsibilities	2 hrs	Wed 10/15/25	Wed 10/15/25			Project Manager
<input checked="" type="checkbox"/>		2.2.2 Create responsibilities assignbnebt matrix	3 hrs	Wed 10/15/25	Wed 10/15/25	48		Project Manager
<input checked="" type="checkbox"/>		2.2.3 Resource histogram	1 hr	Wed 10/15/25	Wed 10/15/25	49		Project Manager
<input checked="" type="checkbox"/>		2.2.4 Human resource management submission	0 days	Wed 10/15/25	Wed 10/15/25	50		Project Manager

Figure 5 WBS - Human Resource Management

The next figure shows the schedule management plan. The milestone of this sub-phase is submitting the schedule management plan.

<input checked="" type="checkbox"/>		↳ 2.3 Schedule Management	1.69 days	Wed 10/15/25	Sun 10/19/25	47		
<input checked="" type="checkbox"/>		2.3.1 Plan Schedule management	3 hrs	Wed 10/15/25	Thu 10/16/25			Project Manager
<input checked="" type="checkbox"/>		2.3.2 Define Activity	3.5 hrs	Thu 10/16/25	Thu 10/16/25	53		Project Manager
<input checked="" type="checkbox"/>		2.3.3 Sequence activities	2 hrs	Thu 10/16/25	Thu 10/16/25	54		Project Manager
<input checked="" type="checkbox"/>		2.3.4 Esitmate activity duration	1 hr	Thu 10/16/25	Thu 10/16/25	55		Project Analyst,Project Manager
<input checked="" type="checkbox"/>		2.3.5 Develop the schedule	4 hrs	Sun 10/19/25	Sun 10/19/25	56		Project Analyst,Project Manager
<input checked="" type="checkbox"/>		2.3.6 Schedule management submission	0 days	Sun 10/19/25	Sun 10/19/25	57		Project Manager

Figure 6 WBS - Schedule Management

The next figure will represent the cost management sub-phase with the cost management plan as the milestone.

<input checked="" type="checkbox"/>		↳ 2.4 Cost Management	0.75 days	Sun 10/19/25	Mon 10/20/25	52		
<input checked="" type="checkbox"/>		2.4.1 Plan cost management	2 hrs	Sun 10/19/25	Sun 10/19/25			Project Manager
<input checked="" type="checkbox"/>		2.4.2 Cost esitmation	2 hrs	Sun 10/19/25	Sun 10/19/25	60		Project Analyst,Project Manager
<input checked="" type="checkbox"/>		2.4.3 Budget determinitaion	2 hrs	Mon 10/20/25	Mon 10/20/25	61		Project Manager
<input checked="" type="checkbox"/>		2.4.4 Cost management submission	0 days	Mon 10/20/25	Mon 10/20/25	62		Project Manager

Figure 7 WBS - Cost Management

Next figure will be talking about the communication management. This sub-phase has the communication management submission as the milestone of this sub-phase

<input checked="" type="checkbox"/>		↳ 2.5 Communication Management	0.56 days	Mon 10/20/25	Mon 10/20/25	59		
<input checked="" type="checkbox"/>		2.5.1 Stakeholders communication analysis	2 hrs	Mon 10/20/25	Mon 10/20/25			Project Manager
<input checked="" type="checkbox"/>		2.5.2 Expectations management matrix	1 hr	Mon 10/20/25	Mon 10/20/25	65		Project Manager
<input checked="" type="checkbox"/>		2.5.3 Stakeholders management strategy and infuence matrix	1.5 hrs	Mon 10/20/25	Mon 10/20/25	66		Project Manager
<input checked="" type="checkbox"/>		2.5.4 Communication management submission	0 days	Mon 10/20/25	Mon 10/20/25	67		Project Manager

Figure 8 WBS - Communication Management

The figure below describes the procurement management. Procurement management submission is set to be the milestone of this sub-phase.

✓	» 2.6 Procurement Management	0.38 days	Mon 10/20/25	Tue 10/21/25	64	
✓	2.6.1 Plan Procurement management plan	1.5 hrs	Mon 10/20/25	Mon 10/20/25		Project Analyst,Project Manager
✓	2.6.2 Conduct procurements	1.5 hrs	Tue 10/21/25	Tue 10/21/25	70	Project Analyst,Project Manager
✓	2.6.3 Procurement management submission	0 days	Tue 10/21/25	Tue 10/21/25	71	Project Manager

Figure 9 WBS - Procurement Management

The next figure shows the quality management phase. The milestone of the sub-phase is the quality management submission.

✓	» 2.7 Quality Management	0.81 days	Tue 10/21/25	Tue 10/21/25	69	
✓	2.7.1 Plan quality management	0.44 days	Tue 10/21/25	Tue 10/21/25		
✓	2.7.1.1 Quality requirements matrix	3.5 hrs	Tue 10/21/25	Tue 10/21/25		Project Analyst,Project Manager
✓	2.7.2 Perform quality assurance	0.38 days	Tue 10/21/25	Tue 10/21/25	74	
✓	2.7.2.1 Quality assurance test	3 hrs	Tue 10/21/25	Tue 10/21/25		Project Analyst,Project Manager
✓	2.7.3 Quality management submission	0 days	Tue 10/21/25	Tue 10/21/25	76	Project Manager

Figure 10 WBS - Quality Management

The next figure shows the risk management phase which has the risk management submission as its milestone.

✓	» 2.8 Risk Management	1.38 days	Wed 10/22/25	Thu 10/23/25	73	
✓	2.8.1 Plan risk management	1.5 hrs	Wed 10/22/25	Wed 10/22/25		Project Manager,Risk Officer
✓	2.8.2 Risk Report	3.5 hrs	Wed 10/22/25	Wed 10/22/25	80	Project Analyst,Project Manager,Risk Officer
✓	2.8.3 Perform risk analysis	4 hrs	Wed 10/22/25	Thu 10/23/25	81	Project Manager,Risk Officer
✓	2.8.4 Plan risk responses	2 hrs	Thu 10/23/25	Thu 10/23/25	82	Project Manager,Risk Officer
✓	2.8.5 Risk management submission	0 days	Thu 10/23/25	Thu 10/23/25	83	Project Manager

Figure 11 WBS - Risk Management

The next figure shows the overview of the Executing phase work breakdown structure that highlights the high-level tasks of the project. The completion of the project will be the milestone.

»	» 3 Executing Phase	30.31 days	Wed 11/5/25	Wed 12/17/25	25	
»	3.1 Designing phase	10.88 days	Wed 11/5/25	Wed 11/19/25		
»	3.2 Implementing phase	14.56 days	Wed 11/19/25	Wed 12/10/25	87	
»	3.3 Testing and verifying phase	4.88 days	Wed 12/10/25	Wed 12/17/25	106	
»	3.4 Completion of the project	0 days	Wed 12/17/25	Wed 12/17/25	130	Project Manager

Figure 12 WBS - Execute Phase Overview

The figure below shows the sub tasks of the designing sub-phase under the executing phase. The designing sub-phase tasks are design the topology, design routing structure, MPLS and QoS design and security and redundancy design. In this phase submitting design documents is considered as the milestone.

	<b>3.1 Designing phase</b>	<b>10.88 days</b>	<b>Wed 11/5/25</b>	<b>Wed 11/19/25</b>		
	<b>3.1.1 Design the topology</b>	<b>2.5 days</b>	<b>Wed 11/5/25</b>	<b>Sun 11/9/25</b>		
	3.1.1.1 Design network topology	1 day	Wed 11/5/25	Wed 11/5/25		Network Engineer (Core)
	3.1.1.2 Plan IP addressing scheme	4 hrs	Thu 11/6/25	Thu 11/6/25	89	Network Engineer (Core)
	3.1.1.3 Determine the segments in the network	8 hrs	Thu 11/6/25	Sun 11/9/25	90	Network Engineer (Core)
	<b>3.1.2 Design routing structure</b>	<b>1.81 days</b>	<b>Sun 11/9/25</b>	<b>Tue 11/11/25</b>	<b>88</b>	
	3.1.2.1 Select and design internal routing protocols	1.5 hrs	Sun 11/9/25	Sun 11/9/25		Network Engineer (Core)
	2.1.2.2 Design external routing protocol	5 hrs	Sun 11/9/25	Mon 11/10/25	93	Network Engineer (Edge)
	3.1.2.3 Design static routing and route summarization	1 day	Mon 11/10/25	Tue 11/11/25	94	Network Engineer (Core)
	<b>3.1.3 MPLS and QoS Design</b>	<b>2.06 days</b>	<b>Tue 11/11/25</b>	<b>Thu 11/13/25</b>	<b>92</b>	
	3.1.3.1 Identify the core devices (P, PE, C and CE)	1.5 hrs	Tue 11/11/25	Tue 11/11/25		Network Engineer (Core)
	3.1.3.2 Define MPLS label distribution method	4 hrs	Tue 11/11/25	Tue 11/11/25	97	Network Engineer (Core)
	3.1.3.3 Plan VRF, RD and RT	3 hrs	Wed 11/12/25	Wed 11/12/25	98	Network Engineer (Edge)
	3.1.3.4 Classify traffic and bandwidth allocation for QoS	1 day	Wed 11/12/25	Thu 11/13/25	99	Network Engineer (Edge), Quality Assurance Specialist
	<b>3.1.4 Security and redundancy design</b>	<b>4.5 days</b>	<b>Thu 11/13/25</b>	<b>Wed 11/19/25</b>	<b>96</b>	
	3.1.4.1 Define AAA	1.5 days	Thu 11/13/25	Sun 11/16/25		Security Specialist
	3.1.4.2 Determine the route map filtering	2 days	Sun 11/16/25	Tue 11/18/25	102	Network Engineer (Edge), Security Specialist
	3.1.4.3 Define redundant links	1 day	Tue 11/18/25	Wed 11/19/25	103	Network Engineer (Core)
	3.1.5 Submit design documents	0 days	Wed 11/19/25	Wed 11/19/25	101	Project Manager

Figure 13 WBS – Design Sub-Phase

The next figure shows the sub tasks of Implementing sub-phase under the execute phase. The implementing sub-phase tasks are hardware preparation, initial network configuration, configure routing protocol, configure MPLS and QoS and configure network services. The milestone of the sub-phase is submitting the implementation document.

	<b>3.2 Implementing phase</b>	<b>14.56 days</b>	<b>Wed 11/19/25</b>	<b>Wed 12/10/25</b>	<b>87</b>	
	<b>3.2.1 Hardware preparation</b>	<b>1.63 days</b>	<b>Wed 11/19/25</b>	<b>Sun 11/23/25</b>		
	3.2.1.1 Power& preparing the devices	2 hrs	Wed 11/19/25	Thu 11/20/25		Cisco ASR 9901[6], Cisco NCS 5501[10], Fiber Optic cables and SFPs[1], Network Engineer (Core), Network Engineer (Edge)
	3.2.1.2 Update the firmware	8 hrs	Thu 11/20/25	Sun 11/23/25	108	Network Engineer (Core)
	3.2.1.3 Verify physical connections	3 hrs	Sun 11/23/25	Sun 11/23/25	109	Network Engineer (Edge)
	<b>3.2.2 Initial network configuration</b>	<b>2.38 days</b>	<b>Sun 11/23/25</b>	<b>Tue 11/25/25</b>	<b>107</b>	
	3.2.2.1 Assign hostnames	4 hrs	Sun 11/23/25	Sun 11/23/25		Network Engineer (Core)
	3.2.2.2 Assign IP address and subnet mask	1.5 days	Mon 11/24/25	Tue 11/25/25	112	Network Engineer (Edge)
	3.2.2.3 Configure management access	3 hrs	Tue 11/25/25	Tue 11/25/25	113	Security Specialist
	<b>3.2.3 Configure routing protocol</b>	<b>6 days</b>	<b>Tue 11/25/25</b>	<b>Wed 12/3/25</b>	<b>111</b>	
	3.2.3.1 Configure OSPF protocol	8 hrs	Tue 11/25/25	Wed 11/26/25		Network Engineer (Core)
	3.2.3.2 Configure EIGRP protocol	8 hrs	Wed 11/26/25	Thu 11/27/25	116	Network Engineer (Edge)
	3.2.3.3 Configure BGP protocol	2 days	Thu 11/27/25	Mon 12/1/25	117	Network Engineer (Core), Network Engineer (Edge)
	3.2.3.4 Configure route maps and redistribution	1 day	Mon 12/1/25	Tue 12/2/25	118	
	3.2.3.5 Configure static routes	1 day	Tue 12/2/25	Wed 12/3/25	119	Network Engineer (Edge)
	<b>3.2.4 Configure MPLS and QoS</b>	<b>3.56 days</b>	<b>Wed 12/3/25</b>	<b>Tue 12/9/25</b>	<b>115</b>	
	3.2.4.1 Deploying MPLS	1 day	Wed 12/3/25	Thu 12/4/25		Network Engineer (Core)
	3.2.4.2 Configure MPLS VPN	2 days	Thu 12/4/25	Mon 12/8/25	122	Network Engineer (Edge)
	3.2.4.3 Integrate quality of service on MPLS VPN	4.5 hrs	Mon 12/8/25	Tue 12/9/25	123	Network Engineer (Edge), Quality Assurance Specialist
	<b>3.2.5 Configure network services</b>	<b>1 day</b>	<b>Tue 12/9/25</b>	<b>Wed 12/10/25</b>	<b>121</b>	
	3.2.5.1 Configure network address translation	3.5 hrs	Tue 12/9/25	Tue 12/9/25		Network Engineer (Edge)
	3.2.5.2 Configure point-to-point connections	3.5 hrs	Tue 12/9/25	Wed 12/10/25	126	Network Engineer (Edge)
	3.2.5.3 Configure authentication, authorization and account	1 hr	Wed 12/10/25	Wed 12/10/25	127	Security Specialist
	3.2.6 Submit the implementation documents	0 days	Wed 12/10/25	Wed 12/10/25	125	Project Manager

Figure 14 WBS – Implementing sub-Phase

The next figure displays the sub tasks of the testing and verifying sub-phase under the execute phase. The testing and verifying sub-phase tasks are basic testing, routing protocols testing, MPLS and QoS testing and testing network services. The milestone in this sub-phase is to submit the testing document.

3.3 Testing and verifying phase	4.88 days	Wed 12/10/25	Wed 12/17/25	106	
4.3.1 Basic testing	0.75 days	Wed 12/10/25	Thu 12/11/25		
3.3.1.1 Verify initial configuration	4 hrs	Wed 12/10/25	Wed 12/10/25		Tester, Quality Assurance Specialist
3.3.1.2 Connectivity testing	2 hrs	Wed 12/10/25	Thu 12/11/25	132	Tester, Quality Assurance Specialist
4.3.2 Routing protocol testing	2 days	Thu 12/11/25	Mon 12/15/25	131	
3.3.2.1 Test OSPF adjacency	4 hrs	Thu 12/11/25	Thu 12/11/25		Tester, Quality Assurance Specialist
3.3.2.2 Testing EIGRP adjacency	4 hrs	Thu 12/11/25	Sun 12/14/25	135	Tester, Quality Assurance Specialist
3.3.2.3 Testing BGP neighbor	4 hrs	Sun 12/14/25	Sun 12/14/25	136	Tester, Quality Assurance Specialist
3.3.2.4 Testing Static routes connections	4 hrs	Sun 12/14/25	Mon 12/15/25	137	Tester, Quality Assurance Specialist
4.3.3 MPLS and QoS testing	1.44 days	Mon 12/15/25	Tue 12/16/25	134	
3.3.3.1 Tesing MPLS	2.5 hrs	Mon 12/15/25	Mon 12/15/25		Tester, Quality Assurance Specialist
3.3.3.2 Testing MPLS VPN connectivity	2 hrs	Mon 12/15/25	Mon 12/15/25	140	Tester, Quality Assurance Specialist
3.3.3.3 Validate and test QoS traffic	4 hrs	Mon 12/15/25	Tue 12/16/25	141	Tester, Quality Assurance Specialist
3.3.3.2 measure the jitter, latency and packet loss	3 hrs	Tue 12/16/25	Tue 12/16/25	142	Tester, Quality Assurance Specialist
4.3.4 Testing network services	0.69 days	Tue 12/16/25	Wed 12/17/25	139	
3.3.4.1 Testing the AAA	2 hrs	Tue 12/16/25	Tue 12/16/25		Tester, Quality Assurance Specialist
3.3.4.2 Testing redundancy	3.5 hrs	Tue 12/16/25	Wed 12/17/25	145	Tester, Quality Assurance Specialist
3.3.5 Submit the testing document	0 days	Wed 12/17/25	Wed 12/17/25	144	Project Manager
3.4 Completion of the project	0 days	Wed 12/17/25	Wed 12/17/25	130	Project Manager

Figure 15 WBS – Testing and verifying sub-Phase

The below figure displays an overview of monitoring and controlling phase work breakdown structure and their tasks in the project. As the monitor and control report submission is the milestone of the phase.

4 Monitor and control phase	4.5 days	Wed 12/17/25	Tue 12/23/25	148	
4.1 Monitor Project activities	0.5 days	Wed 12/17/25	Wed 12/17/25		Project Manager
4.2 Scope validation	0.5 days	Wed 12/17/25	Thu 12/18/25	150	Project Manager
4.3 Scope verification	0.5 days	Thu 12/18/25	Thu 12/18/25	151	Project Manager
4.4 Communication control	0.5 days	Thu 12/18/25	Sun 12/21/25	152	Project Manager
4.5 Schedule control	0.5 days	Sun 12/21/25	Sun 12/21/25	153	Project Manager
4.6 Cost control	0.5 days	Sun 12/21/25	Mon 12/22/25	154	Project Manager
4.7 Procurement control	0.5 days	Mon 12/22/25	Mon 12/22/25	155	Project Manager
4.8 Quality control	0.5 days	Mon 12/22/25	Tue 12/23/25	156	Project Manager
4.9 Risk control	0.5 days	Tue 12/23/25	Tue 12/23/25	157	Project Manager
4.10 Monitor and control report submission	0 days	Tue 12/23/25	Tue 12/23/25	158	Project Manager

Figure 16 WBS - Monitoring and control Phase

The below figure displays an overview of the project closing phase work breakdown structure and its tasks in this project, with the monitor and control report submission as the final milestone of the phase.

	5 Closing the project	4 days	Tue 12/23/25	Mon 12/29/25	159	
	5.1 Gather all required documents	4 hrs	Tue 12/23/25	Wed 12/24/25		Project Manager
	5.2 Checklist all accomplished requirements	1 day	Wed 12/24/25	Thu 12/25/25	161	Project Manager
	5.3 Obtain all stakeholders signatures	1.5 days	Thu 12/25/25	Sun 12/28/25	162	Project Manager
	5.4 Archive all project files	4 hrs	Sun 12/28/25	Mon 12/29/25	163	Project Manager
	5.5 Release all project resources	1.5 hrs	Mon 12/29/25	Mon 12/29/25	164	Project Manager
	5.6 Notify stakeholders about project completion	0.5 hrs	Mon 12/29/25	Mon 12/29/25	165	Project Manager
	5.7 Closing meeting	2 hrs	Mon 12/29/25	Mon 12/29/25	166	Project Manager
	5.8 Submit the project	0 days	Mon 12/29/25	Mon 12/29/25	167	Project Manager

**Figure 17 WBS - Closing the project Phase**

## Scope verification

Validating the scope will be conducted at every end of each major phase by being reviewed against approved scope, requirements, stakeholders' acceptance and testing. Final approval will be obtained from the IT department through documented sign-off after being tested in a simulated environment. Testing in simulation will confirm that all network features and performance objectives are met before final acceptance.

Two possible outcomes in this scenario:

- Getting rejected with some change request in one or more major phases in the project
- Getting approved and proceeding with the next phase of the project

## Scope control

Scope controlling is the most critical part of the process. Scope will be controlled in each step. In the project any requested changes will lead to submitting a new scope plan with the newly added requests, which will be reviewed and processed by the IT department and the sponsor before getting approved. The outcome of the scope baseline, WBS and schedule will be updated to match the newly added request.

# Time Management Plan

## Introduction

Time management is the process of dividing the time between the project tasks and deliverables according to the deadlines. The schedule management plan lay down the timeline that the project follows during the execute phase as it will declare and specify the approach that the project manager will be using to create and form the project baseline. The project baseline will include all detailed tasks, duration of each task and the person responsible for performing the task.

## Process

The time management process that is used in this project is divided into 4 steps:

- **Defining tasks:** Break the whole project into smaller tasks to identifying the task sequence. In This step the sequence of the tasks is identified along with the dependency's verification. The dependency used in this project is finish-to-start.
- **Resource & Duration estimation:** The identification of resources needed to achieve the task and calculating the duration that is needed for each task in the life cycle of the project.
- **Developing the schedule:** The creation of the Gannt chart to create a baseline schedule to outline the start time and the finish time of each task in the project.
- **Schedule control:** monitor and control any changes that could happen to the tasks by creating a baseline.

## Objectives

- Declare the amount of time needed to complete the project.
- Organize project activities on a fixed schedule.
- Monitor and control the progress

## Roles and Responsibilities

The table below represents the RACI table which stands for Responsible, Accountable, Consulted and Informed. The table will showcase the tasks and the level responsibility of each member when developing the time management plan.

Responsible	Accountable	Consulted	Informed
Project Manager	Project Manager	Client, Supervisor, Project Analyst	All stakeholders

Table 5 Time Management RACI

## Approach

There are several approaches used to follow human resource management in this project:

- **Gantt Chart:** A diagram that shows all tasks in a hierarchical order alongside resources and sequence order.
- **Network Diagram:** A diagram that is mainly used to show the critical tasks it is also shows how the tasks are connected to each other.
- **Schedule Variance and Schedule Performance Index:** both of them are indicators that are used alongside the Gantt chart to measure performance. Schedule Variance finds whether the project is on time or not and Schedule Performance Index calculates how efficient the progress of the project.
- **Baseline Reports:** a visual report that illustrates the actual progress of the project with the baseline values.

## SV and SPI Changes

To determine the team progress in the project in terms of time management. The SV and SPI variables is already calculated during the developing of the schedule. The explanation below outlines the value of each variable:

### 1. Schedule Variance:

- If the schedule variance is equal to 0, the project is on schedule
- If the schedule variance is negative, the project is behind schedule
- If the schedule variance is positive, the project is ahead of schedule

### 2. Schedule Performance Index:

- If the schedule performance index is equal to 1, the project is on schedule
- If the schedule performance index is less than 1.0, the project is behind schedule
- If the schedule performance index is greater than 1.0, the project is ahead of schedule

## Gantt Chart

The Gantt Chart is a visual representation of entire project. The Gantt chart displays all the project tasks that needs to be accomplished to consider the project completion. Gantt chart displays the task duration, resource assigned to it and the dependencies between the other tasks. Furthermore, it shows the milestones of project. Overall, the Gantt chart is an essential tool that helps the project manager to distribute the tasks and keep tracks on them.

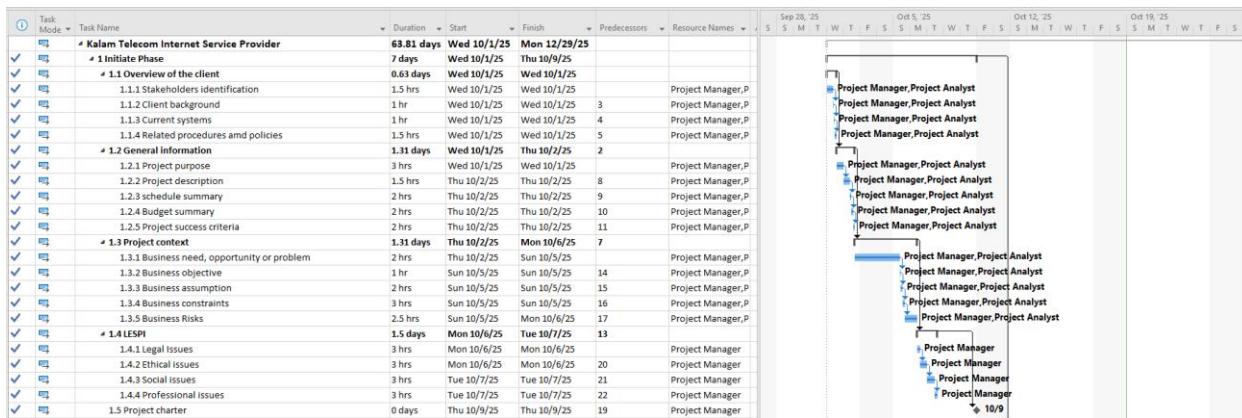


Figure 18 Gantt Chart - Initiate Phase

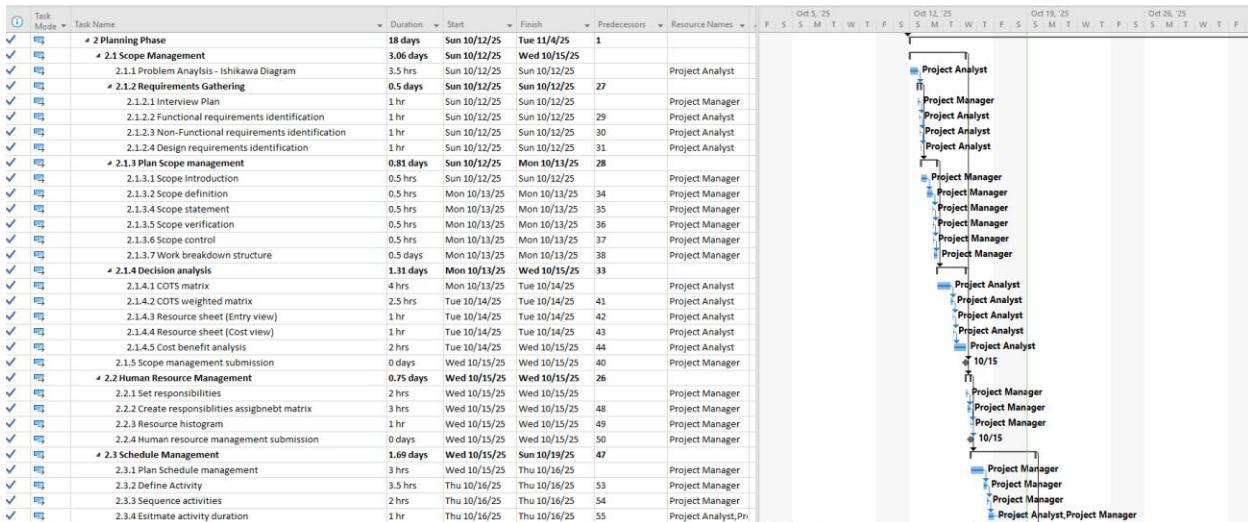


Figure 19 Gantt Chart - Planning Phase Part 1

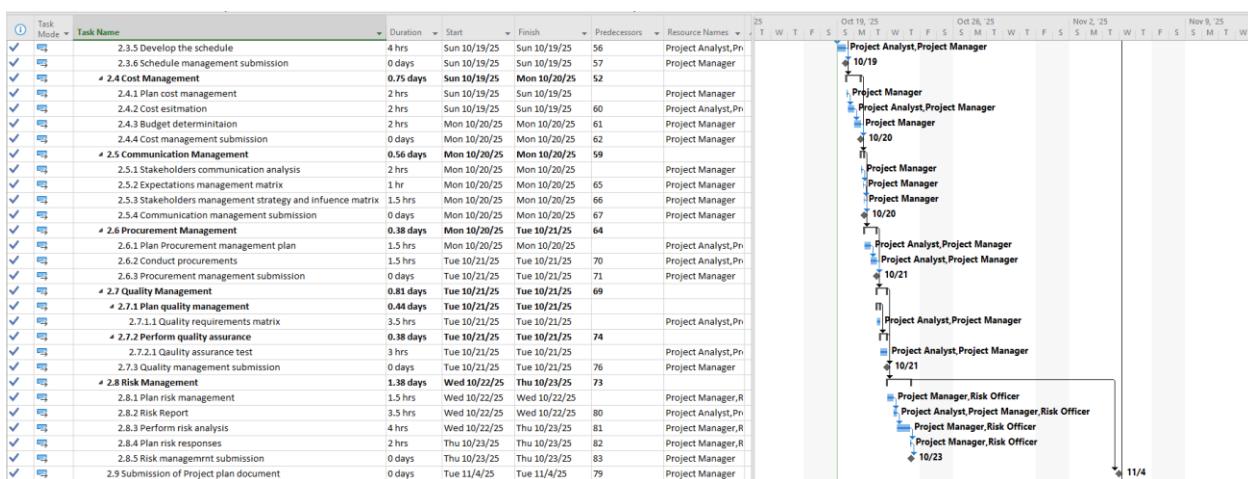


Figure 20 Gantt Chart - Planning Phase Part 2

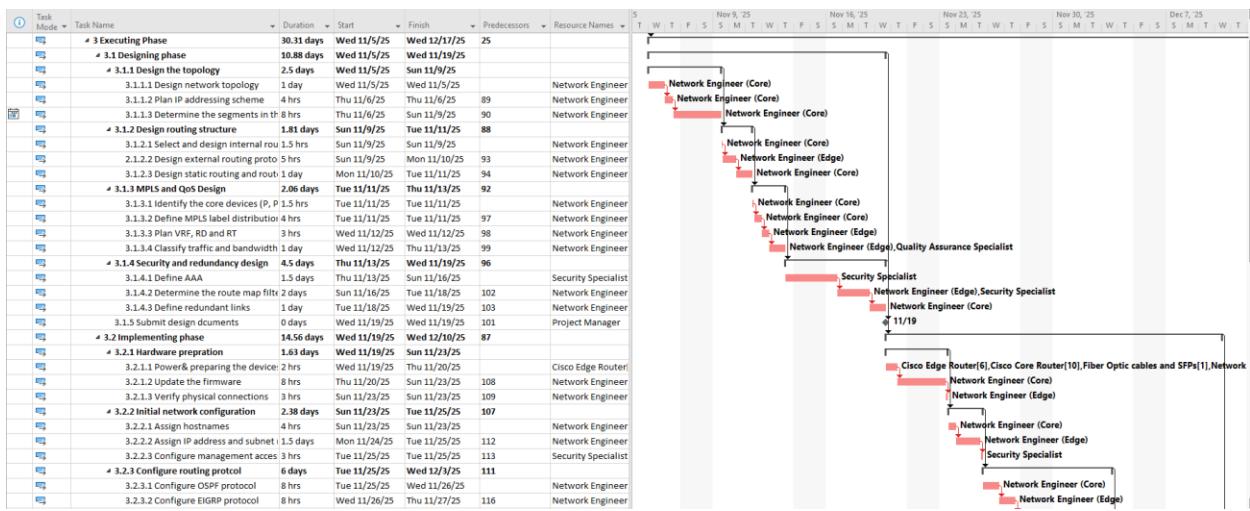


Figure 21 Gantt Chart - Executing Phase Part 1

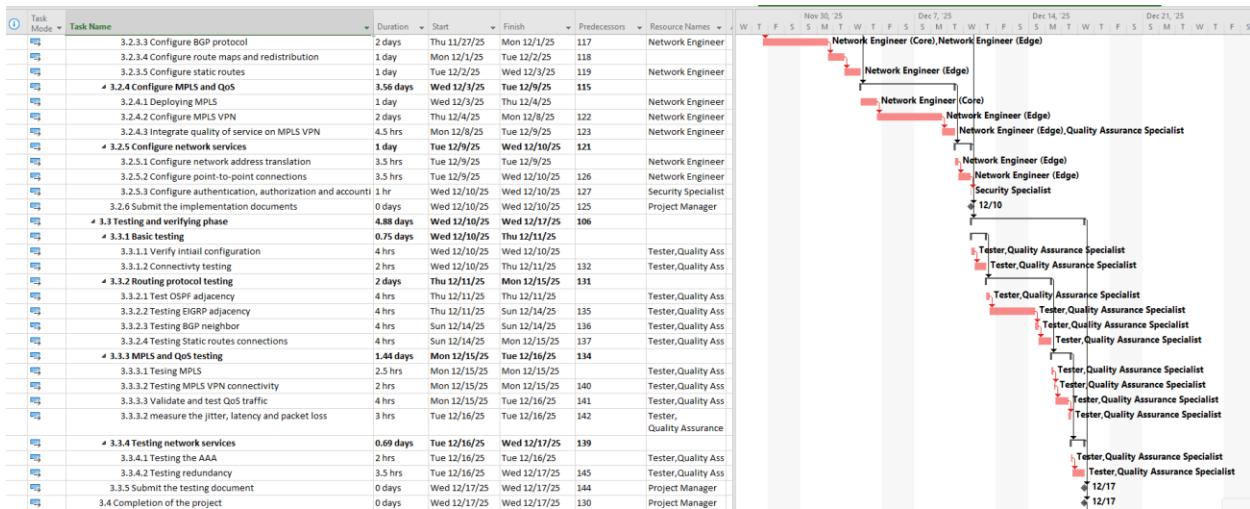


Figure 22 Gantt Chart - Executing Phase Part 2

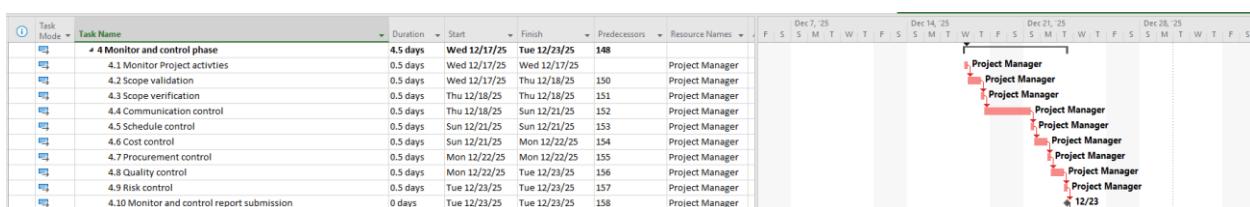


Figure 23 Gantt Chart - Monitor and control Phase

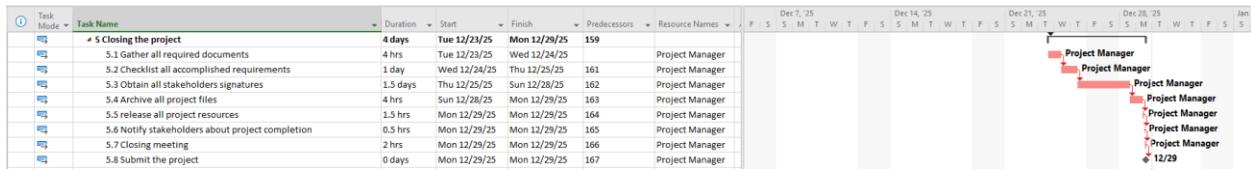


Figure 24 Gantt Chart - Closing Phase

## Network Diagram

Network Diagram is a visual illustration of the whole tasks in a project that appears in the Gantt chart. It tells the duration of each task and the progress alongside the person responsible for that task. Tasks in the network diagram are classifying into two types; first type is the normal task which is represented by a square and the second type is the milestone which is represented by a diamond shape. In addition, the tasks that are highlighted with the color red indicate that these tasks are critical tasks and must be completed within the specified time. In the other hand tasks highlighted with the color blue indicates that these are not critical tasks or has been completed already.

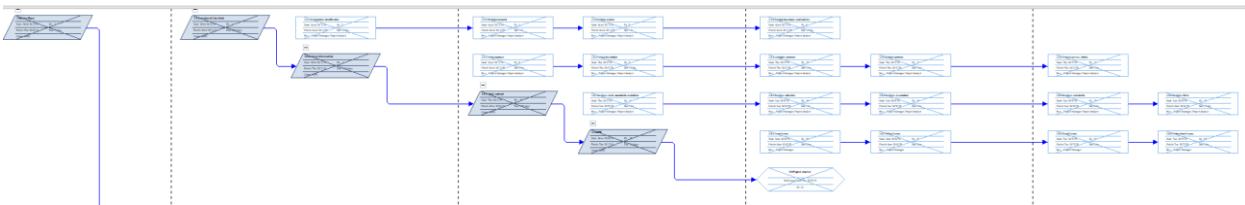


Figure 25 Network Diagram - Initiate Part Full Diagram

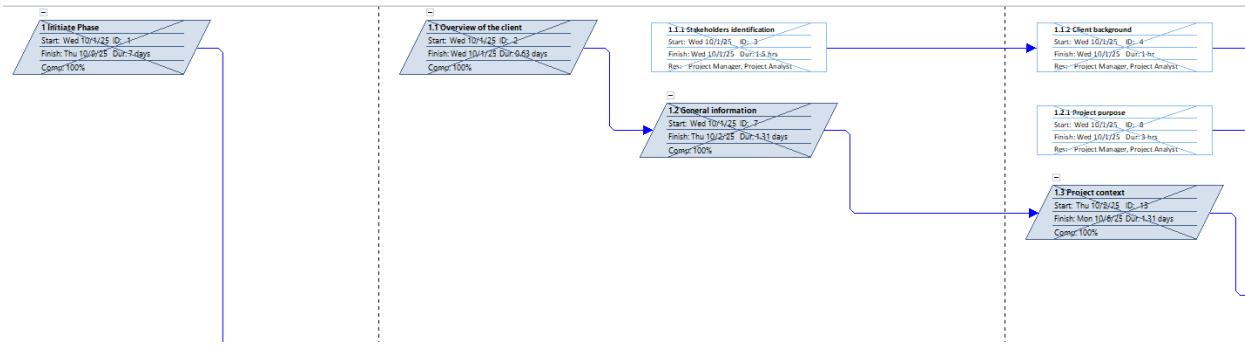


Figure 26 Network Diagram - Initiate Phase Part 1

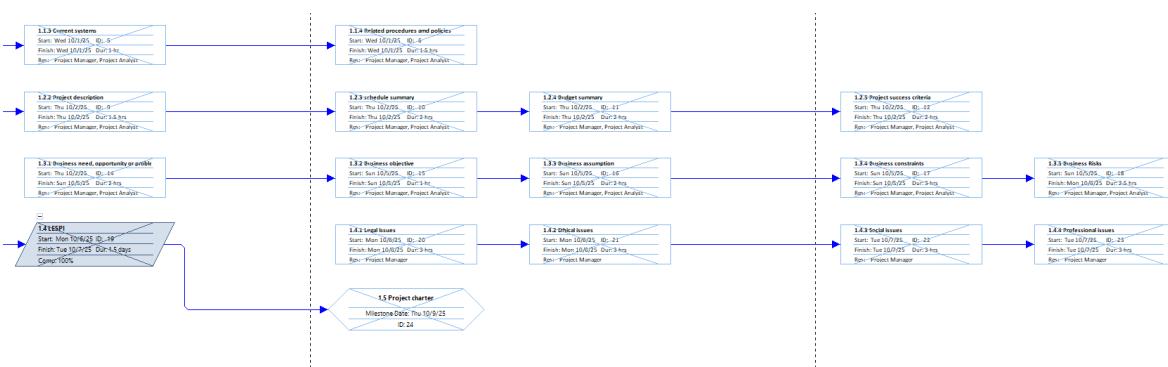
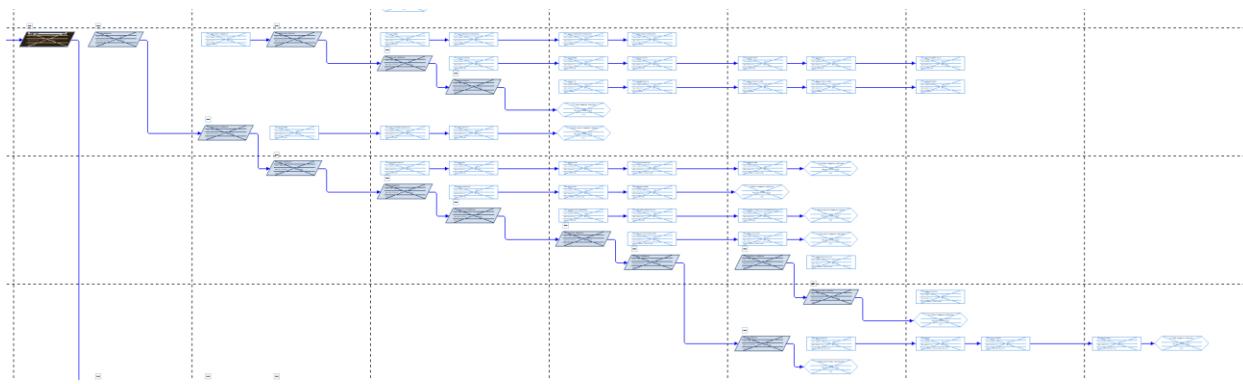
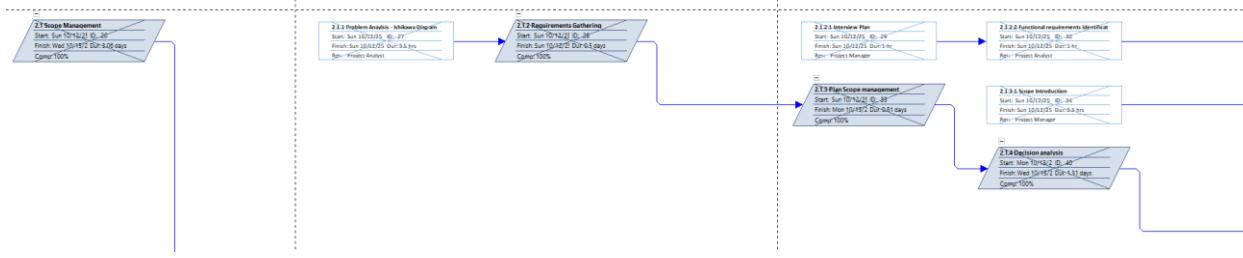


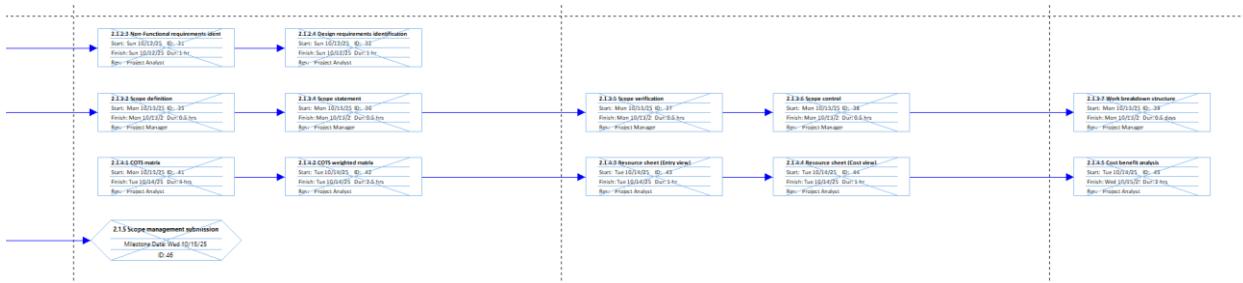
Figure 27 Network Diagram - Initiate Phase Part 2



**Figure 28 Network Diagram - Planning Phase Full Diagram**



**Figure 29 Network Diagram - Scope Management Part 1**



**Figure 30 Network Diagram - Scope Management Part 2**



Figure 31 Network Diagram - Human Resource Management



Figure 32 Network Diagram - Schedule Management Part 1

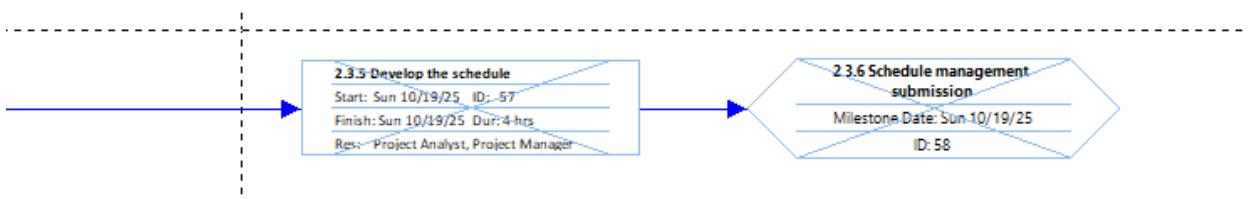


Figure 33 Network Diagram - Schedule Management Part 2



Figure 34 Network Diagram - Cost Management



Figure 35 Network Diagram - Communication Management

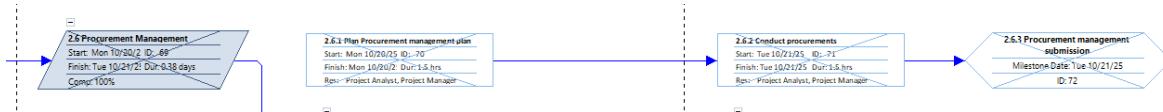


Figure 36 Network Diagram - Procurement Management

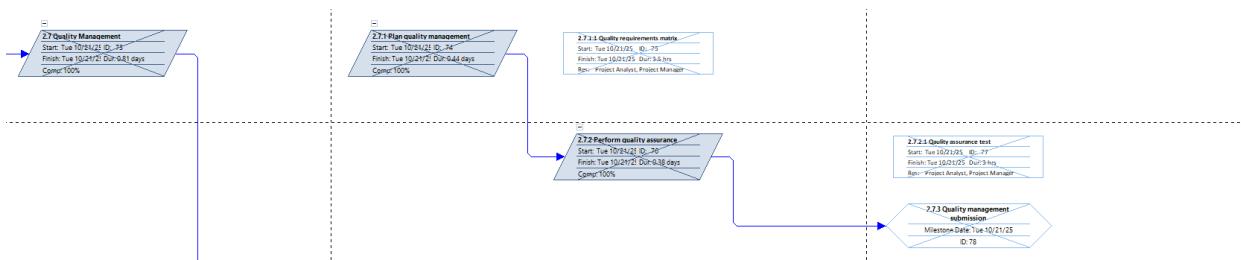


Figure 37 Network Diagram - Quality Management

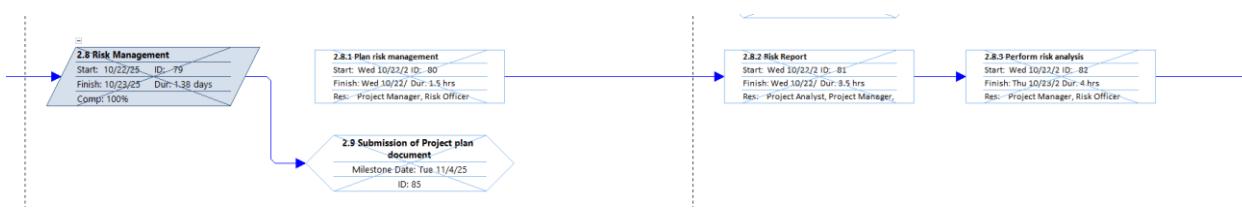


Figure 38 Network Diagram - Risk Management Part 1

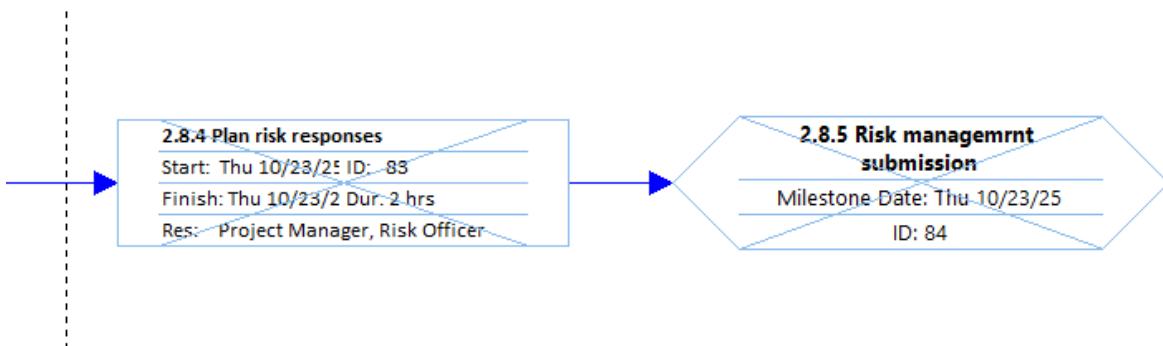
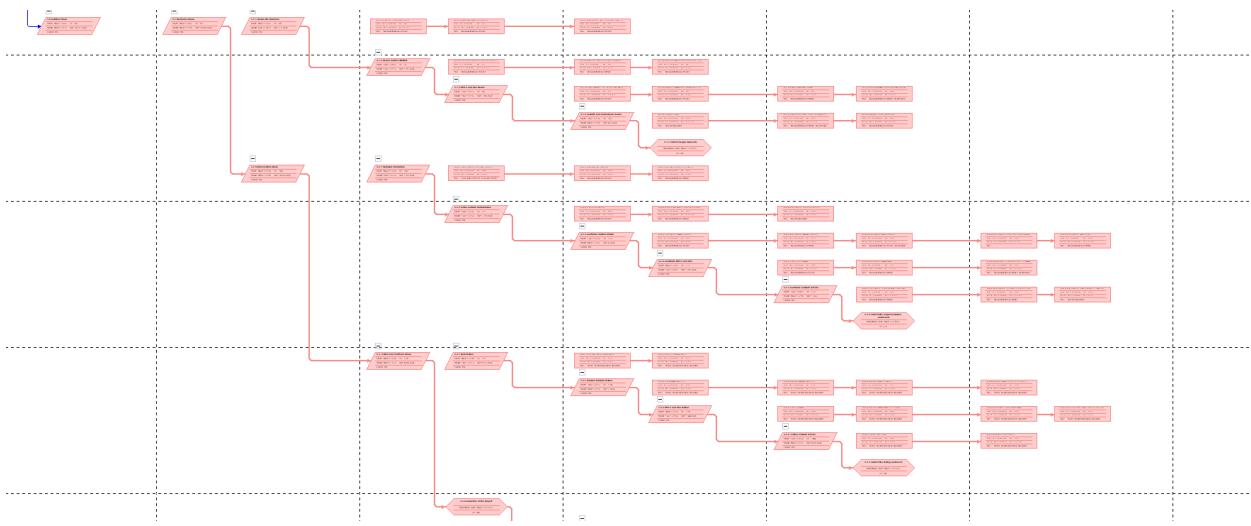
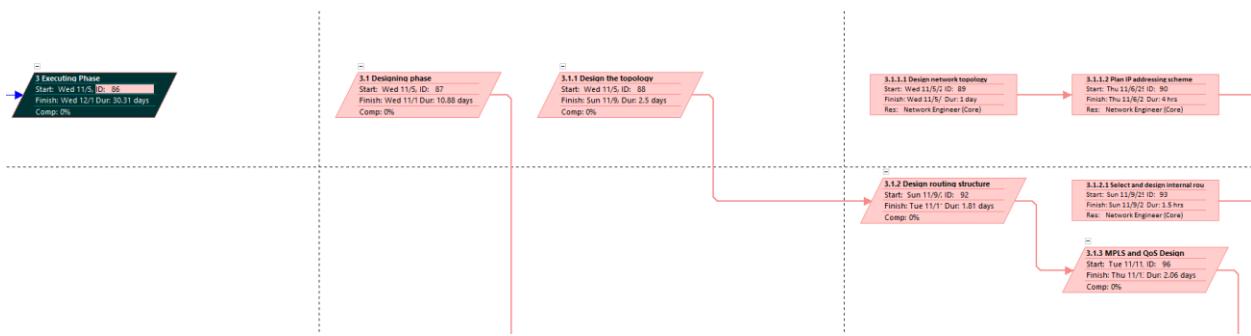


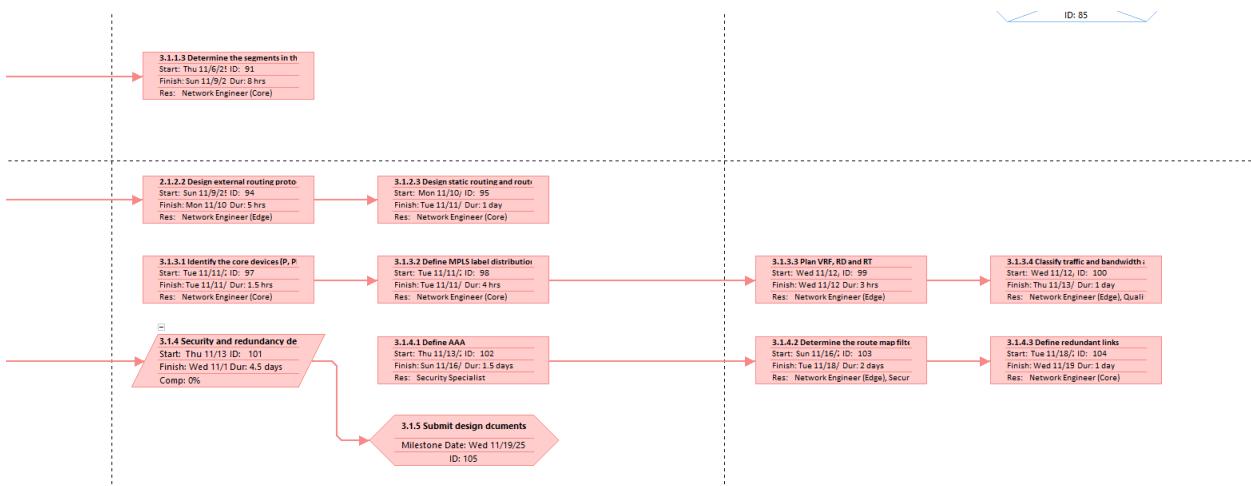
Figure 39 Network Diagram - Risk Management Part 2



**Figure 40 Network Diagram - Executing Phase Full Diagram**



**Figure 41 Network Diagram - Executing Phase (Designing Phase) Part 1**



**Figure 42 Network Diagram - Executing Phase (Designing Phase) Part 2**

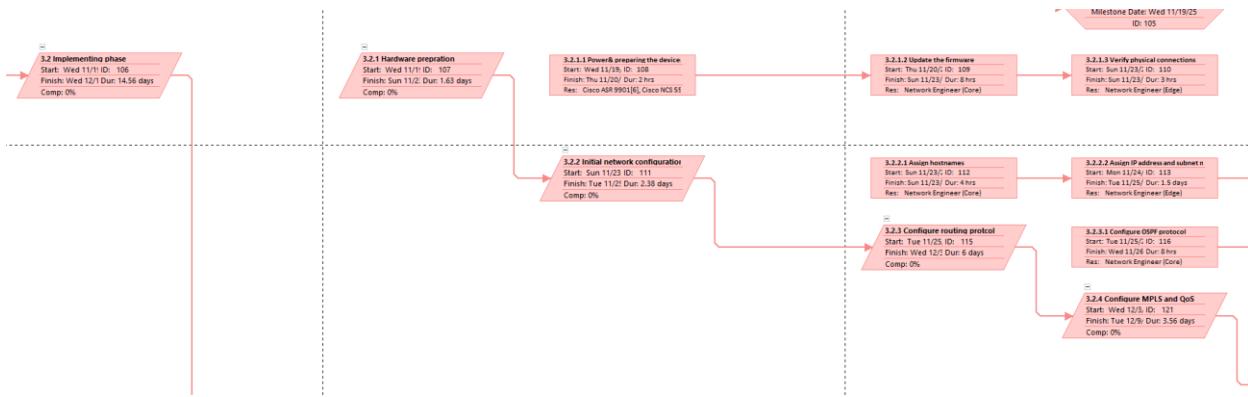


Figure 43 Network Diagram - Executing Phase (Implementation Phase) Part 1

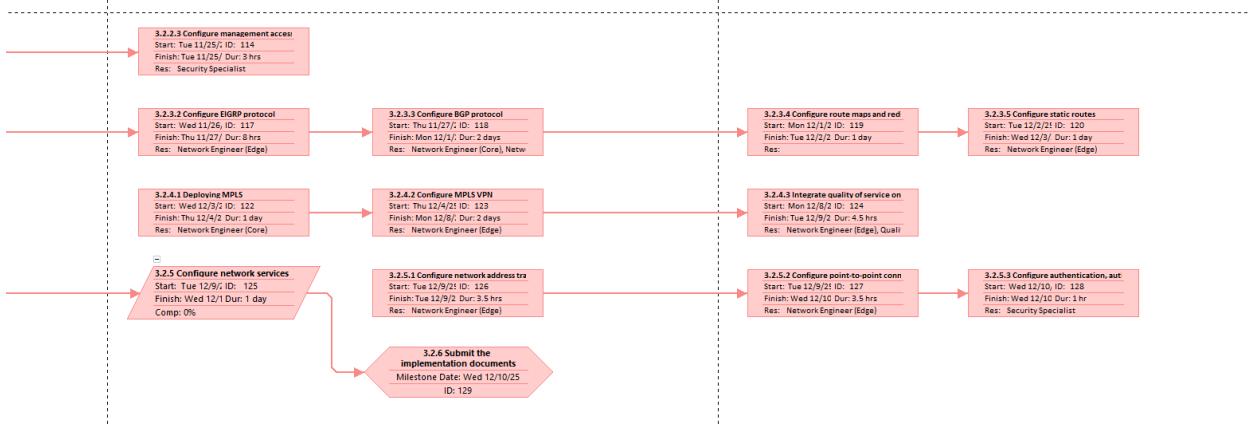


Figure 44 Network Diagram - Executing Phase (Implementing Phase) Part 2

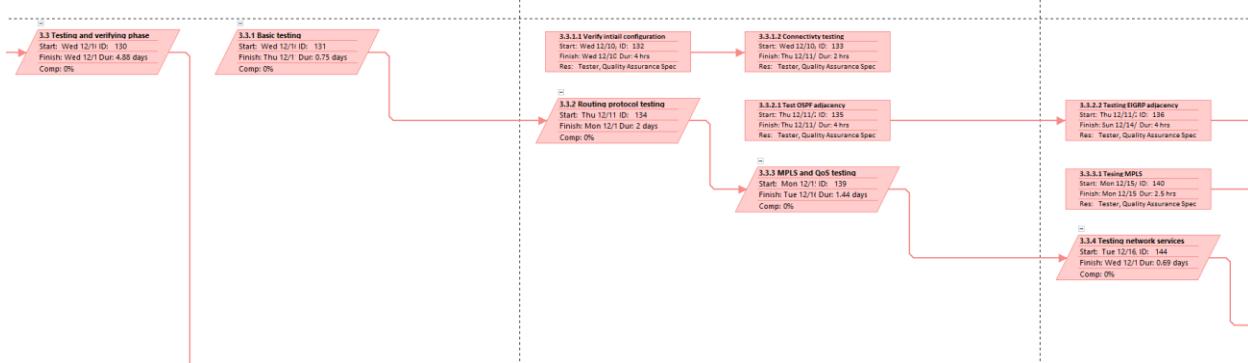


Figure 45 Network Diagram - Executing Phase (Testing Phase) Part 1

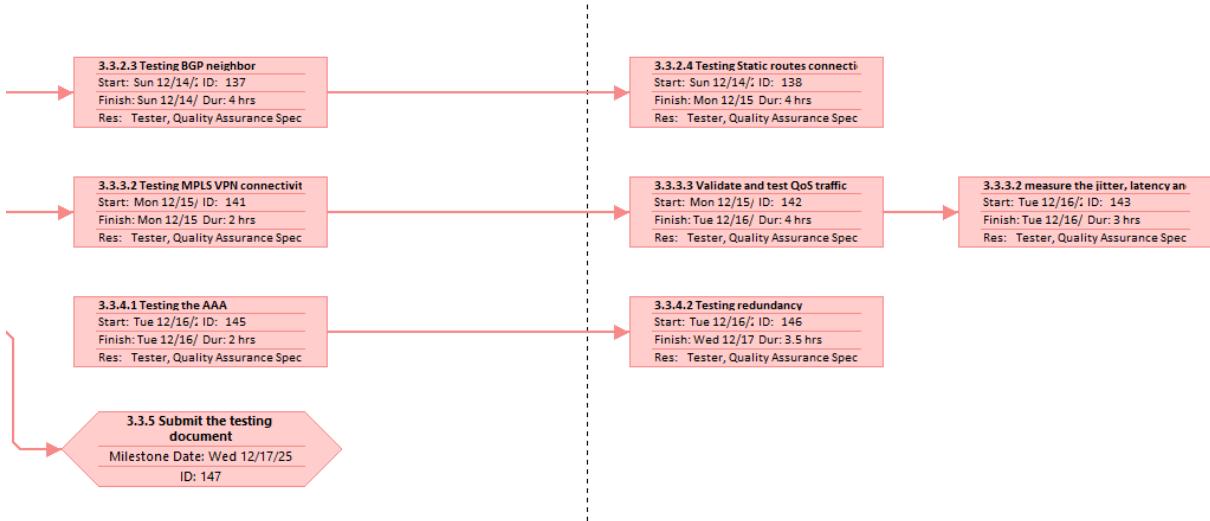


Figure 46 Network Diagram - Executing Phase (Testing Phase) Part 2

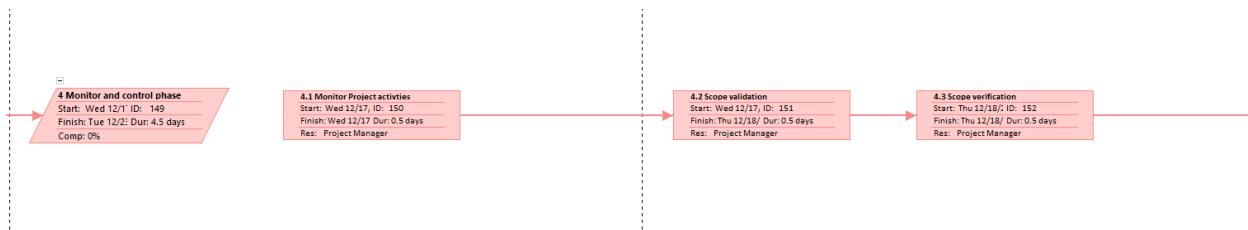


Figure 47 Network Diagram - Monitor and Control Phase Part 1



Figure 48 Network Diagram - Monitor and Control Phase Part 2

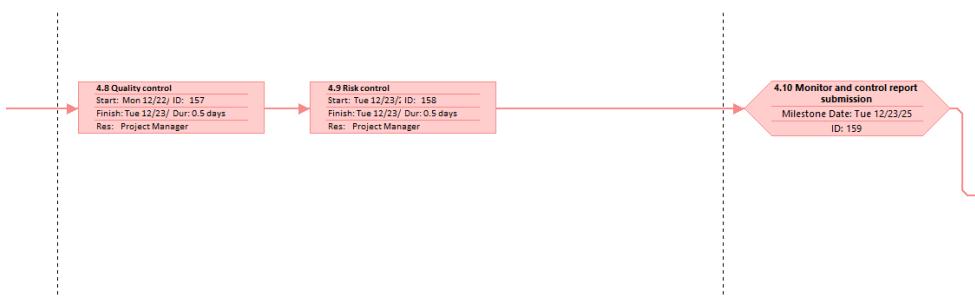


Figure 49 Network Diagram - Monitor and Control Phase Part 3

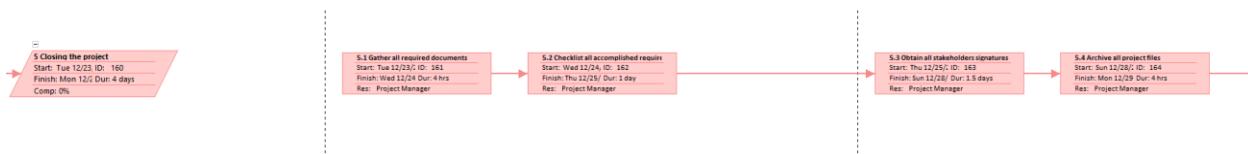


Figure 50 Network Diagram - Closing Phase Part 1



Figure 51 Network Diagram - Closing Phase Part 2

## Schedule Variance and Schedule Performance Index

The next figures describe the baseline schedule timing which includes the start timing of the baseline and the end timing of the baseline. It also includes the SV and SPI variables that indicate if the project is on time, ahead of time or behind time.

Task Mode	Task Name	Baseline Start	Baseline Finish	SV	SPI
→	▫ Kalam Telecom Internet Service Provider	Wed 10/1/25	Mon 12/29/25	\$0.00	1
→	▫ 1 Initiate Phase	Wed 10/1/25	Thu 10/9/25	\$0.00	1
→	▫ 1.1 Overview of the client	Wed 10/1/25	Wed 10/1/25	\$0.00	1
→	1.1.1 Stakeholders identification	Wed 10/1/25	Wed 10/1/25	\$0.00	1
→	1.1.2 Client background	Wed 10/1/25	Wed 10/1/25	\$0.00	1
→	1.1.3 Current systems	Wed 10/1/25	Wed 10/1/25	\$0.00	1
→	1.1.4 Related procedures amd policies	Wed 10/1/25	Wed 10/1/25	\$0.00	1
→	▫ 1.2 General information	Wed 10/1/25	Thu 10/2/25	\$0.00	1
→	1.2.1 Project purpose	Wed 10/1/25	Wed 10/1/25	\$0.00	1
→	1.2.2 Project description	Thu 10/2/25	Thu 10/2/25	\$0.00	1
→	1.2.3 schedule summary	Thu 10/2/25	Thu 10/2/25	\$0.00	1
→	1.2.4 Budget summary	Thu 10/2/25	Thu 10/2/25	\$0.00	1
→	1.2.5 Project success criteria	Thu 10/2/25	Thu 10/2/25	\$0.00	1
→	▫ 1.3 Project context	Thu 10/2/25	Mon 10/6/25	\$0.00	1
→	1.3.1 Business need, opportunity or problem	Thu 10/2/25	Sun 10/5/25	\$0.00	1
→	1.3.2 Business objective	Sun 10/5/25	Sun 10/5/25	\$0.00	1
→	1.3.3 Business assumption	Sun 10/5/25	Sun 10/5/25	\$0.00	1
→	1.3.4 Business constraints	Sun 10/5/25	Sun 10/5/25	\$0.00	1
→	1.3.5 Business Risks	Sun 10/5/25	Mon 10/6/25	\$0.00	1
→	▫ 1.4 LESPI	Mon 10/6/25	Tue 10/7/25	\$0.00	1
→	1.4.1 Legal Issues	Mon 10/6/25	Mon 10/6/25	\$0.00	1
→	1.4.2 Ethical issues	Mon 10/6/25	Mon 10/6/25	\$0.00	1
→	1.4.3 Social issues	Tue 10/7/25	Tue 10/7/25	\$0.00	1
→	1.4.4 Professional issues	Tue 10/7/25	Tue 10/7/25	\$0.00	1
→	1.5 Project charter	Thu 10/9/25	Thu 10/9/25	\$0.00	0

Figure 52 Schedule Variance and Schedule Performance Index – Initiate Phase

Task Mode	Task Name	Baseline Start	Baseline Finish	SV	SPI
→	↳ 2 Planning Phase	Sun 10/12/25	Tue 11/4/25	\$0.00	1
→	↳ 2.1 Scope Management	Sun 10/12/25	Wed 10/15/25	\$0.00	1
→	2.1.1 Problem Anaylsis - Ishikawa Diagram	Sun 10/12/25	Sun 10/12/25	\$0.00	1
→	↳ 2.1.2 Requirements Gathering	Sun 10/12/25	Sun 10/12/25	\$0.00	1
→	2.1.2.1 Interview Plan	Sun 10/12/25	Sun 10/12/25	\$0.00	1
→	2.1.2.2 Functional requirements identification	Sun 10/12/25	Sun 10/12/25	\$0.00	1
→	2.1.2.3 Non-Functional requirements identification	Sun 10/12/25	Sun 10/12/25	\$0.00	1
→	2.1.2.4 Design requirements identification	Sun 10/12/25	Sun 10/12/25	\$0.00	1
→	↳ 2.1.3 Plan Scope management	Sun 10/12/25	Mon 10/13/25	\$0.00	1
→	2.1.3.1 Scope Introduction	Sun 10/12/25	Sun 10/12/25	\$0.00	1
→	2.1.3.2 Scope definition	Mon 10/13/25	Mon 10/13/25	\$0.00	1
→	2.1.3.4 Scope statement	Mon 10/13/25	Mon 10/13/25	\$0.00	1
→	2.1.3.5 Scope verification	Mon 10/13/25	Mon 10/13/25	\$0.00	1
→	2.1.3.6 Scope control	Mon 10/13/25	Mon 10/13/25	\$0.00	1
→	2.1.3.7 Work breakdown structure	Mon 10/13/25	Mon 10/13/25	\$0.00	1
→	↳ 2.1.4 Decision analysis	Mon 10/13/25	Wed 10/15/25	\$0.00	1
→	2.1.4.1 COTS matrix	Mon 10/13/25	Tue 10/14/25	\$0.00	1
→	2.1.4.2 COTS weighted matrix	Tue 10/14/25	Tue 10/14/25	\$0.00	1
→	2.1.4.3 Resource sheet (Entry view)	Tue 10/14/25	Tue 10/14/25	\$0.00	1
→	2.1.4.4 Resource sheet (Cost view)	Tue 10/14/25	Tue 10/14/25	\$0.00	1
→	2.1.4.5 Cost benefit analysis	Tue 10/14/25	Wed 10/15/25	\$0.00	1
→	2.1.5 Scope management submission	Wed 10/15/25	Wed 10/15/25	\$0.00	0
→	↳ 2.2 Human Resource Management	Wed 10/15/25	Wed 10/15/25	\$0.00	1
→	2.2.1 Set responsibilities	Wed 10/15/25	Wed 10/15/25	\$0.00	1
→	2.2.2 Create responsibilities assigbnebt matrix	Wed 10/15/25	Wed 10/15/25	\$0.00	1
→	2.2.3 Resource histogram	Wed 10/15/25	Wed 10/15/25	\$0.00	1
→	2.2.4 Human resource management submission	Wed 10/15/25	Wed 10/15/25	\$0.00	0
→	↳ 2.3 Schedule Management	Wed 10/15/25	Sun 10/19/25	\$0.00	1
→	2.3.1 Plan Schedule management	Wed 10/15/25	Thu 10/16/25	\$0.00	1
→	2.3.2 Define Activity	Thu 10/16/25	Thu 10/16/25	\$0.00	1
→	2.3.3 Sequence activities	Thu 10/16/25	Thu 10/16/25	\$0.00	1
→	2.3.4 Esitmte activity duration	Thu 10/16/25	Thu 10/16/25	\$0.00	1

Figure 53 Schedule Variance and Schedule Performance Index - Planning Phase Part 1

Task Mode	Task Name	Baseline Start	Baseline Finish	SV	SPI
→	2.3.5 Develop the schedule	Sun 10/19/25	Sun 10/19/25	\$0.00	1
→	2.3.6 Schedule management submission	Sun 10/19/25	Sun 10/19/25	\$0.00	0
→	↳ <b>2.4 Cost Management</b>	<b>Sun 10/19/25</b>	<b>Mon 10/20/25</b>	<b>\$0.00</b>	<b>1</b>
→	2.4.1 Plan cost management	Sun 10/19/25	Sun 10/19/25	\$0.00	1
→	2.4.2 Cost esitmation	Sun 10/19/25	Sun 10/19/25	\$0.00	1
→	2.4.3 Budget determinitaion	Mon 10/20/25	Mon 10/20/25	\$0.00	0
→	2.4.4 Cost management submission	Mon 10/20/25	Mon 10/20/25	\$0.00	0
→	↳ <b>2.5 Communication Management</b>	<b>Mon 10/20/25</b>	<b>Mon 10/20/25</b>	<b>\$0.00</b>	<b>0</b>
→	2.5.1 Stakeholders communication analysis	Mon 10/20/25	Mon 10/20/25	\$0.00	0
→	2.5.2 Expectations management matrix	Mon 10/20/25	Mon 10/20/25	\$0.00	0
→	2.5.3 Stakeholders management strategy and infuence matrix	Mon 10/20/25	Mon 10/20/25	\$0.00	0
→	2.5.4 Communication management submission	Mon 10/20/25	Mon 10/20/25	\$0.00	0
→	↳ <b>2.6 Procurement Management</b>	<b>Mon 10/20/25</b>	<b>Tue 10/21/25</b>	<b>\$0.00</b>	<b>0</b>
→	2.6.1 Plan Procurement management plan	Mon 10/20/25	Mon 10/20/25	\$0.00	0
→	2.6.2 Conduct procurements	Tue 10/21/25	Tue 10/21/25	\$0.00	0
→	2.6.3 Procurement management submission	Tue 10/21/25	Tue 10/21/25	\$0.00	0
→	↳ <b>2.7 Quality Management</b>	<b>Tue 10/21/25</b>	<b>Tue 10/21/25</b>	<b>\$0.00</b>	<b>0</b>
→	↳ <b>2.7.1 Plan quality management</b>	<b>Tue 10/21/25</b>	<b>Tue 10/21/25</b>	<b>\$0.00</b>	<b>0</b>
→	2.7.1.1 Quality requirements matrix	Tue 10/21/25	Tue 10/21/25	\$0.00	0
→	↳ <b>2.7.2 Perform quality assurance</b>	<b>Tue 10/21/25</b>	<b>Tue 10/21/25</b>	<b>\$0.00</b>	<b>0</b>
→	2.7.2.1 Qaulity assurance test	Tue 10/21/25	Tue 10/21/25	\$0.00	0
→	2.7.3 Quality management submission	Tue 10/21/25	Tue 10/21/25	\$0.00	0
→	↳ <b>2.8 Risk Management</b>	<b>Wed 10/22/25</b>	<b>Thu 10/23/25</b>	<b>\$0.00</b>	<b>0</b>
→	2.8.1 Plan risk management	Wed 10/22/25	Wed 10/22/25	\$0.00	0
→	2.8.2 Risk Report	Wed 10/22/25	Wed 10/22/25	\$0.00	0
→	2.8.3 Perform risk analysis	Wed 10/22/25	Thu 10/23/25	\$0.00	0
→	2.8.4 Plan risk responses	Thu 10/23/25	Thu 10/23/25	\$0.00	0
→	2.8.5 Risk managemrnt submission	Thu 10/23/25	Thu 10/23/25	\$0.00	0
→	2.9 Submission of Project plan document	Tue 11/4/25	Tue 11/4/25	\$0.00	0

Figure 54 Schedule Variance and Schedule Performance Index - Planning Phase Part 2

Task Mode	Task Name	Baseline Start	Baseline Finish	SV	SPI
→	↳ 3 Executing Phase	Wed 11/5/25	Wed 12/17/25	\$0.00	0
→	↳ 3.1 Designing phase	Wed 11/5/25	Wed 11/19/25	\$0.00	0
→	↳ 3.1.1 Design the topology	Wed 11/5/25	Sun 11/9/25	\$0.00	0
→	3.1.1.1 Design network topology	Wed 11/5/25	Wed 11/5/25	\$0.00	0
→	3.1.1.2 Plan IP addressing scheme	Thu 11/6/25	Thu 11/6/25	\$0.00	0
→	3.1.1.3 Determine the segments in the network	Thu 11/6/25	Sun 11/9/25	\$0.00	0
→	↳ 3.1.2 Design routing structure	Sun 11/9/25	Tue 11/11/25	\$0.00	0
→	3.1.2.1 Select and design internal routing protocols	Sun 11/9/25	Sun 11/9/25	\$0.00	0
→	2.1.2.2 Design external routing protocol	Sun 11/9/25	Mon 11/10/25	\$0.00	0
→	3.1.2.3 Design static routing and route summarization	Mon 11/10/25	Tue 11/11/25	\$0.00	0
→	↳ 3.1.3 MPLS and QoS Design	Tue 11/11/25	Thu 11/13/25	\$0.00	0
→	3.1.3.1 Identify the core devices (P, PE, C and CE)	Tue 11/11/25	Tue 11/11/25	\$0.00	0
→	3.1.3.2 Define MPLS label distribution method	Tue 11/11/25	Tue 11/11/25	\$0.00	0
→	3.1.3.3 Plan VRF, RD and RT	Wed 11/12/25	Wed 11/12/25	\$0.00	0
→	3.1.3.4 Classify traffic and bandwidth allocation for QoS	Wed 11/12/25	Thu 11/13/25	\$0.00	0
→	↳ 3.1.4 Security and redundancy design	Thu 11/13/25	Wed 11/19/25	\$0.00	0
→	3.1.4.1 Define AAA	Thu 11/13/25	Sun 11/16/25	\$0.00	0
→	3.1.4.2 Determine the route map filtering	Sun 11/16/25	Tue 11/18/25	\$0.00	0
→	3.1.4.3 Define redundant links	Tue 11/18/25	Wed 11/19/25	\$0.00	0
→	3.1.5 Submit design documents	Wed 11/19/25	Wed 11/19/25	\$0.00	0
→	↳ 3.2 Implementing phase	Wed 11/19/25	Wed 12/10/25	\$0.00	0
→	↳ 3.2.1 Hardware preparation	Wed 11/19/25	Sun 11/23/25	\$0.00	0
→	3.2.1.1 Power& preparing the devices	Wed 11/19/25	Thu 11/20/25	\$0.00	0
→	3.2.1.2 Update the firmware	Thu 11/20/25	Sun 11/23/25	\$0.00	0
→	3.2.1.3 Verify physical connections	Sun 11/23/25	Sun 11/23/25	\$0.00	0
→	↳ 3.2.2 Initial network configuration	Sun 11/23/25	Tue 11/25/25	\$0.00	0
→	3.2.2.1 Assign hostnames	Sun 11/23/25	Sun 11/23/25	\$0.00	0
→	3.2.2.2 Assign IP address and subnet mask	Mon 11/24/25	Tue 11/25/25	\$0.00	0
→	3.2.2.3 Configure management access	Tue 11/25/25	Tue 11/25/25	\$0.00	0
→	↳ 3.2.3 Configure routing protocol	Tue 11/25/25	Wed 12/3/25	\$0.00	0
→	3.2.3.1 Configure OSPF protocol	Tue 11/25/25	Wed 11/26/25	\$0.00	0
→	3.2.3.2 Configure EIGRP protocol	Wed 11/26/25	Thu 11/27/25	\$0.00	0

Figure 55 Schedule Variance and Schedule Performance Index - Executing Phase Part 1

Task Mode	Task Name	Baseline Start	Baseline Finish	SV	SPI
→	3.2.3.3 Configure BGP protocol	Thu 11/27/25	Mon 12/1/25	\$0.00	0
→	3.2.3.4 Configure route maps and redistribution	Mon 12/1/25	Tue 12/2/25	\$0.00	0
→	3.2.3.5 Configure static routes	Tue 12/2/25	Wed 12/3/25	\$0.00	0
→	↳ 3.2.4 Configure MPLS and QoS	Wed 12/3/25	Tue 12/9/25	\$0.00	0
→	3.2.4.1 Deploying MPLS	Wed 12/3/25	Thu 12/4/25	\$0.00	0
→	3.2.4.2 Configure MPLS VPN	Thu 12/4/25	Mon 12/8/25	\$0.00	0
→	3.2.4.3 Integrate quality of service on MPLS VPN	Mon 12/8/25	Tue 12/9/25	\$0.00	0
→	↳ 3.2.5 Configure network services	Tue 12/9/25	Wed 12/10/25	\$0.00	0
→	3.2.5.1 Configure network address translation	Tue 12/9/25	Tue 12/9/25	\$0.00	0
→	3.2.5.2 Configure point-to-point connections	Tue 12/9/25	Wed 12/10/25	\$0.00	0
→	3.2.5.3 Configure authentication, authorization and accounting	Wed 12/10/25	Wed 12/10/25	\$0.00	0
→	3.2.6 Submit the implementation documents	Wed 12/10/25	Wed 12/10/25	\$0.00	0
→	↳ 3.3 Testing and verifying phase	Wed 12/10/25	Wed 12/17/25	\$0.00	0
→	↳ 3.3.1 Basic testing	Wed 12/10/25	Thu 12/11/25	\$0.00	0
→	3.3.1.1 Verify initial configuration	Wed 12/10/25	Wed 12/10/25	\$0.00	0
→	3.3.1.2 Connectivity testing	Wed 12/10/25	Thu 12/11/25	\$0.00	0
→	↳ 3.3.2 Routing protocol testing	Thu 12/11/25	Mon 12/15/25	\$0.00	0
→	3.3.2.1 Test OSPF adjacency	Thu 12/11/25	Thu 12/11/25	\$0.00	0
→	3.3.2.2 Testing EIGRP adjacency	Thu 12/11/25	Sun 12/14/25	\$0.00	0
→	3.3.2.3 Testing BGP neighbor	Sun 12/14/25	Sun 12/14/25	\$0.00	0
→	3.3.2.4 Testing Static routes connections	Sun 12/14/25	Mon 12/15/25	\$0.00	0
→	↳ 3.3.3 MPLS and QoS testing	Mon 12/15/25	Tue 12/16/25	\$0.00	0
→	3.3.3.1 Testing MPLS	Mon 12/15/25	Mon 12/15/25	\$0.00	0
→	3.3.3.2 Testing MPLS VPN connectivity	Mon 12/15/25	Mon 12/15/25	\$0.00	0
→	3.3.3.3 Validate and test QoS traffic	Mon 12/15/25	Tue 12/16/25	\$0.00	0
→	3.3.3.4 measure the jitter, latency and packet loss	Tue 12/16/25	Tue 12/16/25	\$0.00	0
→	↳ 3.3.4 Testing network services	Tue 12/16/25	Wed 12/17/25	\$0.00	0
→	3.3.4.1 Testing the AAA	Tue 12/16/25	Tue 12/16/25	\$0.00	0
→	3.3.4.2 Testing redundancy	Tue 12/16/25	Wed 12/17/25	\$0.00	0
→	3.3.5 Submit the testing document	Wed 12/17/25	Wed 12/17/25	\$0.00	0
→	3.4 Completion of the project	Wed 12/17/25	Wed 12/17/25	\$0.00	0

Figure 56 Schedule Variance and Schedule Performance Index - Executing Phase Part 2

Task Mode	Task Name	Baseline Start	Baseline Finish	SV	SPI
→	↳ 4 Monitor and control phase	Wed 12/17/25	Tue 12/23/25	\$0.00	0
→	4.1 Monitor Project activities	Wed 12/17/25	Wed 12/17/25	\$0.00	0
→	4.2 Scope validation	Wed 12/17/25	Thu 12/18/25	\$0.00	0
→	4.3 Scope verification	Thu 12/18/25	Thu 12/18/25	\$0.00	0
→	4.4 Communication control	Thu 12/18/25	Sun 12/21/25	\$0.00	0
→	4.5 Schedule control	Sun 12/21/25	Sun 12/21/25	\$0.00	0
→	4.6 Cost control	Sun 12/21/25	Mon 12/22/25	\$0.00	0
→	4.7 Procurement control	Mon 12/22/25	Mon 12/22/25	\$0.00	0
→	4.8 Quality control	Mon 12/22/25	Tue 12/23/25	\$0.00	0
→	4.9 Risk control	Tue 12/23/25	Tue 12/23/25	\$0.00	0
→	4.10 Monitor and control report submission	Tue 12/23/25	Tue 12/23/25	\$0.00	0

Figure 57 Schedule Variance and Schedule Performance Index - Monitor and Control Phase

Task Mode	Task Name	Baseline Start	Baseline Finish	SV	SPI	A
→	↳ 5 Closing the project	Tue 12/23/25	Mon 12/29/25	\$0.00	0	
→	5.1 Gather all required documents	Tue 12/23/25	Wed 12/24/25	\$0.00	0	
→	5.2 Checklist all accomplished requirements	Wed 12/24/25	Thu 12/25/25	\$0.00	0	
→	5.3 Obtain all stakeholders signatures	Thu 12/25/25	Sun 12/28/25	\$0.00	0	
→	5.4 Archive all project files	Sun 12/28/25	Mon 12/29/25	\$0.00	0	
→	5.5 Release all project resources	Mon 12/29/25	Mon 12/29/25	\$0.00	0	
→	5.6 Notify stakeholders about project completion	Mon 12/29/25	Mon 12/29/25	\$0.00	0	
→	5.7 Closing meeting	Mon 12/29/25	Mon 12/29/25	\$0.00	0	
→	5.8 Submit the project	Mon 12/29/25	Mon 12/29/25	\$0.00	0	

Figure 58 Schedule Variance and Schedule Performance Index - Closing Phase

## Baseline Reports

Baseline report is a visual diagram that outlines the progress and the completed work from the beginning of the project until the moment that the report has been generated. It displays the completed work and compares it to the baseline plan. Furthermore, it points out the project stages to inform the project manager if the team is behind schedule, ahead of schedule or on schedule in a certain stage. Generating this report regularly helps the project manager with the monitoring process of the project.

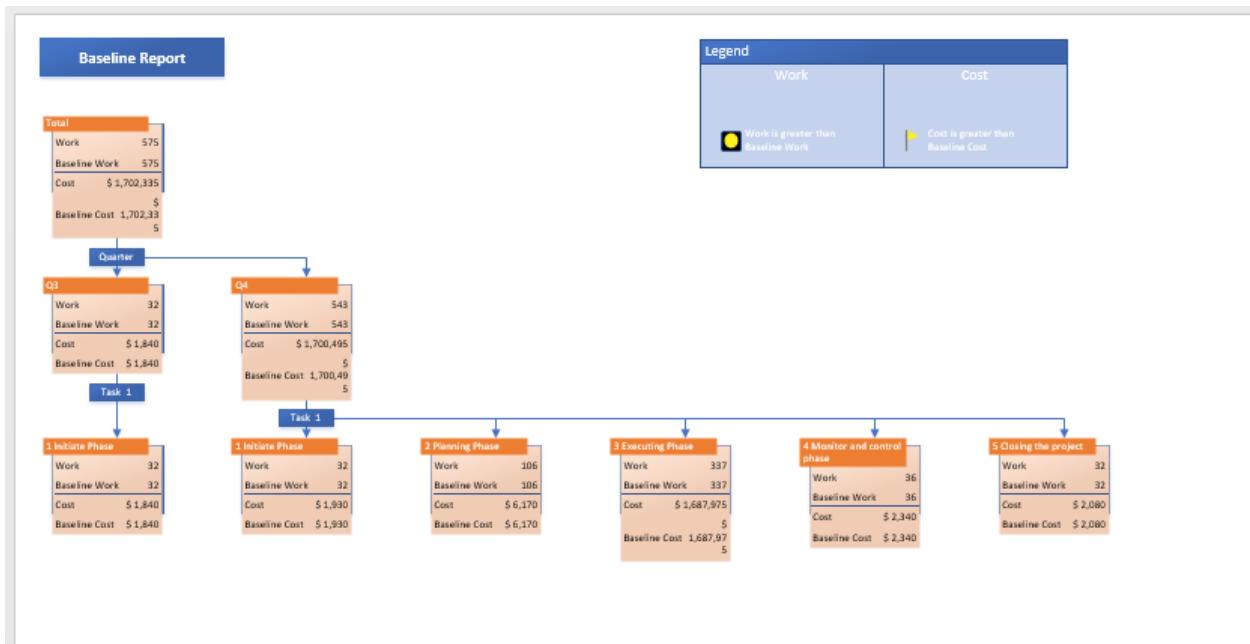


Figure 59 Baseline Report

## Critical Task Status Report

The below figure illustrates the critical tasks report which displays critical task status of the main five phases of the project alongside with the progress of the work and the remaining progress. Furthermore, this report is very helpful for the project manager as it focuses on identifying the critical tasks that needs to be completed on time without a slack time.

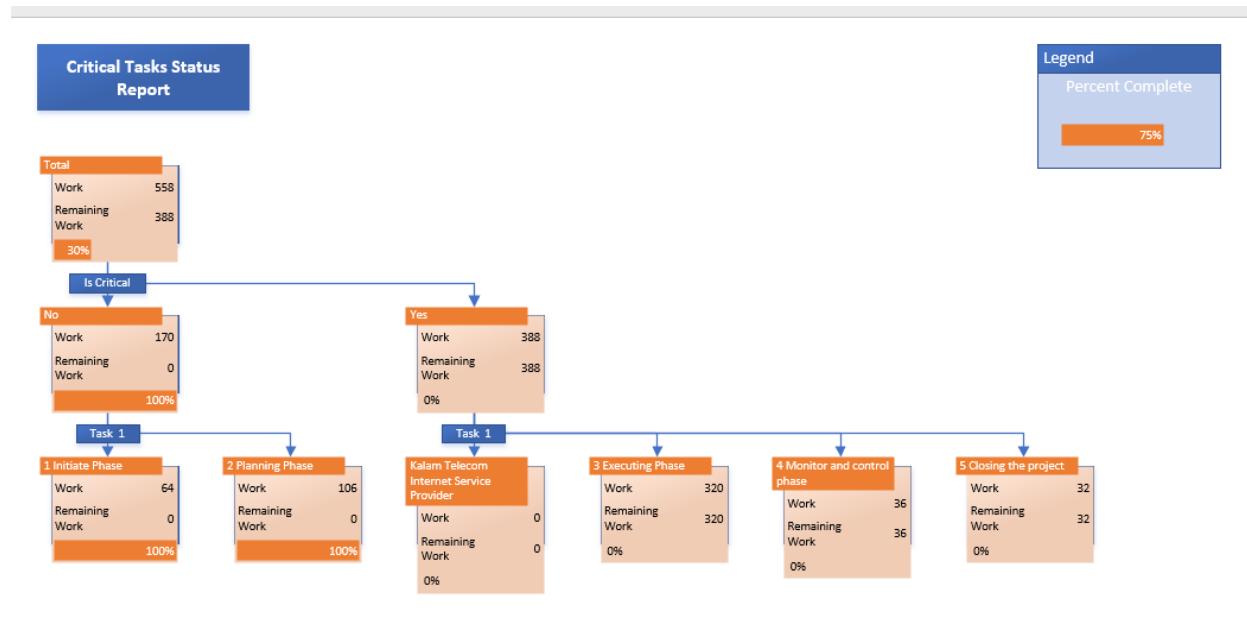


Figure 60 Critical Task Status Report

# Cost Management Plan

## Introduction

The cost management plan is the process that identifies how the project costs will be managed throughout the project life cycle. In addition to measuring, recording and managing the cost during the project implementation phase. Furthermore, it also describes the action that should be taken when any changes occur to the original cost.

## Process

The cost management process that was used in the development of this project consists of 3 steps:

- **Cost estimating:** Create an estimation of cost for all the required resources. The resources include human labor, hardware, software and facilities.
- **Determine the budget:** determine the budget for the entire project by summing up all resources cost.
- **Controlling the cost:** Control and monitoring the cost during the project implementation phase.

## Objectives

- Estimate an accurate budget
- Avoiding budget overspending
- Control the flow of cash

## Roles and Responsibilities

The table below represents the RACI table which stands for Responsible, Accountable, Consulted and Informed. The table will showcase the tasks and the level responsibility of each member when developing cost management.

Responsible	Accountable	Consulted	Informed
Project Manager	Project Manager	Client, Supervisor, Project Analyst	All stakeholders

Table 6 Cost Management RACI

## Approach

There are two approaches used to follow cost management in this project:

- **Resource Sheet using MS Project:** A tool used to identify all resources in the project along with the cost rates of these resources furthermore, it displays estimating of the total costs of each task under the project plan.
- **Cost Benefit Analysis:** Uses the net present value to measures the expected benefit of the project against its costs and to determine the breakeven point.
- **Visual Representation:** A method that illustrates project cost using chat and graph. Also is displays a clear understanding of how the budget and controlled over time.
- **Cost Variance and Cost Performance Index:** Both of them are considered as indicator that are used alongside the project schedule and cost to track how well the costs are being managed throughout the project.

## CV and CPI changes

To determine the team progress in the project in terms of cost management. The CV and CPI variables is already calculated during the developing of the project life cycle. The explanation below outlines the value of each variable:

1. Cost Variance:
  - If the cost variance is equal to 0, the project is on budget
  - If the cost variance is negative, the project is exceeding the budget
  - If the cost variance is positive, the project is under budget
2. Cost Performance Index:
  - If the cost performance index is equal to 1, the project is on budget
  - If the cost performance index is less than 1, the project is exceeding the budget
  - If the cost performance index is greater than 1, the project is under budget

# Reports

## Resource Sheet

The figure below lists all the resources used in the project. It shows the resources type whether they are work resources cost resources and material resources, and how much they cost per hour and which of these resources has one time cost. It is a very helpful tool to the project manager to keep a detailed record of all project resources, all in one place.

	Resource Name	Name	Type	Material	Initials	Group	Max.	Std.	Ovt.	Cost/Use	Accrue	Base
1	Project Manager	Hasan Bahzad	Work		P		100%	\$65.00/hr	\$0.00/hr	\$0.00	Prorated	Standard
2	Network Engineer (Core)	Hasan Ahmadi	Work		N		100%	\$60.00/hr	\$0.00/hr	\$0.00	Prorated	Standard
3	Network Engineer (Edge)	Salman Ali	Work		N		100%	\$60.00/hr	\$0.00/hr	\$0.00	Prorated	Standard
4	Security Specialist	Raju Kumar	Work		S		100%	\$50.00/hr	\$0.00/hr	\$0.00	Prorated	Standard
5	Tester	Mohammed Zuhair	Work		T		100%	\$50.00/hr	\$0.00/hr	\$0.00	Prorated	Standard
6	Quality Assurance Specialist	Ali Abdulla	Work		Q		100%	\$50.00/hr	\$0.00/hr	\$0.00	Prorated	Standard
7	Risk Officer	Hussain Abdulhadi	Work		R		100%	\$50.00/hr	\$0.00/hr	\$0.00	Prorated	Standard
8	Project Analyst	Oliver Smith	Work		P		100%	\$50.00/hr	\$0.00/hr	\$0.00	Prorated	Standard
9	Cisco Edge Router		Material		C				120,000.00		\$0.00	Prorated
10	Cisco Core Router		Material		C				\$60,000.00		\$0.00	Prorated
11	Fiber Optic cables and SFPs		Material		F				\$0.00	350,000.00	Prorated	

Figure 61 Cost Management - Resource Sheet Entry View

The below figure outlines the calculated cost for each resource used during the project development. It provides an insight into the full sum of all resource costs. In addition, this figure can assist and help to calculate the total budget of the project.

	Resource Name	Person Name	Cost	Baseline	Variance	Actual Cost	Remaining	A
1	Project Manager	Hasan Bahzad	\$10,660.00	\$10,660.00	\$0.00	\$6,240.00	\$4,420.00	
2	Network Engineer (Core)	Hasan Ahmadi	\$5,340.00	\$5,340.00	\$0.00	\$0.00	\$5,340.00	
3	Network Engineer (Edge)	Salman Ali	\$6,510.00	\$6,510.00	\$0.00	\$0.00	\$6,510.00	
4	Security Specialist	Raju Kumar	\$1,600.00	\$1,600.00	\$0.00	\$0.00	\$1,600.00	
5	Tester	Mohammed Zuhair	\$1,950.00	\$1,950.00	\$0.00	\$0.00	\$1,950.00	
6	Quality Assurance Specialist	Ali Abdulla	\$2,575.00	\$2,575.00	\$0.00	\$0.00	\$2,575.00	
7	Risk Officer	Hussain Abdulhadi	\$550.00	\$550.00	\$0.00	\$550.00	\$0.00	
8	Project Analyst	Oliver Smith	\$3,150.00	\$3,150.00	\$0.00	\$3,150.00	\$0.00	
9	Cisco Edge Router		\$720,000.00	\$720,000.00	\$0.00	\$0.00	\$720,000.00	
10	Cisco Core Router		\$600,000.00	\$600,000.00	\$0.00	\$0.00	\$600,000.00	
11	Fiber Optic cables and SFPs		\$350,000.00	\$350,000.00	\$0.00	\$0.00	\$350,000.00	

Figure 62 Cost Management - Resource Sheet Cost View

## Cost Benefit Analysis

Cost Benefit Analysis helps the project manager in identifying and comparing the initial cost of project resources and the potential benefits that come from the project to calculate the payback period and assess the overall financial feasibility.

Cost-Benefit Analysis							
Cash Flow Description	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
<b>Costs</b>							
Development Costs : Estimated in MS Project Resource Sheet	-32335.00						
Hardware Costs - Estimated in MS Project Resource Sheet	-1670000.00						
Software Licenses	-40000.00						
Operational and Maintenance Costs	-30000.00	-30000.00	-30000.00	-30000.00	-30000.00	-30000.00	-30000.00
Power & Cooling	-25000.00	-25000.00	-25000.00	-25000.00	-25000.00	-25000.00	-25000.00
Transit Fees between ISPs	-90000.00	-90000.00	-90000.00	-90000.00	-90000.00	-90000.00	-90000.00
System Upgrades	-11000.00	-11000.00	-11000.00	-11000.00	-11000.00	-11000.00	-11000.00
<b>Total Costs</b>	<b>-1742335.00</b>	<b>-156000.00</b>	<b>-156000.00</b>	<b>-156000.00</b>	<b>-156000.00</b>	<b>-156000.00</b>	<b>-156000.00</b>
<b>Benefits</b>							
Savings in leased fixed network line	150000.00	150000.00	150000.00	150000.00	150000.00	150000.00	150000.00
Reducing downtime	80710.00	80710.00	80710.00	80710.00	80710.00	80710.00	80710.00
MPLS VPN subscription revenue	500000.00	500000.00	500000.00	500000.00	500000.00	500000.00	500000.00
QoS subscription revenue	480000.00	480000.00	480000.00	480000.00	480000.00	480000.00	480000.00
Efficiency improvement	35000.00	35000.00	35000.00	35000.00	35000.00	35000.00	35000.00
Savings in training	15000.00	15000.00	15000.00	15000.00	15000.00	15000.00	15000.00
Improving security	30000.00	30000.00	30000.00	30000.00	30000.00	30000.00	30000.00
<b>Total Benefits</b>	<b>1290710.00</b>	<b>1290710.00</b>	<b>1290710.00</b>	<b>1290710.00</b>	<b>1290710.00</b>	<b>1290710.00</b>	<b>1290710.00</b>
Profit before tax	-1742335.00	1134710.00	1134710.00	1134710.00	1134710.00	1134710.00	1134710.00
Profit After Tax (10%)	-1742335.00	1021239.00	1021239.00	1021239.00	1021239.00	1021239.00	1021239.00
Discount factors for 12%	1.0000	0.8929	0.7972	0.7118	0.6355	0.5674	0.5066
Profit Present Values	-1742335.00	911820.54	814125.48	726897.75	649015.85	579478.43	517391.40
<b>Accumulated Profit</b>	<b>-1742335.00</b>	<b>-830514.46</b>	<b>-16388.99</b>	<b>710508.76</b>	<b>1359524.61</b>	<b>1939003.04</b>	<b>2456394.50</b>
Internal Rate of Return	54.2640627%	Calculated by Excel. Scroll down to see how to do that manually.					
ROI							The NPV of the Project

Figure 63 Cost Management - Cost Benefit Analysis

### Calculation of the Payback Period

We see that the accumulated NPV changes sign between years 2 and 3, which means that somewhere in that interval NPV function must be equal to 0. Recall that NPV represents the profit, and when the profit is 0, we have got the break-even. Determining the point of intersection, we actually determine the payback period. Let's see how to do that.

Firstly, we determine the absolute value of NPV change in the interval [2, 3]. At the end of year 2, the value of NPV is -16388.99 and at the end of year 3 it is 710508.76. The absolute value is

$$|-16388.99| + 710508.76 = 726897.75 \quad <\dots \text{ change per year}$$

Secondly, we devide the obtained NPV value by 12 to see the change per month in that particular interval [2, 3].

$$726897.75 / 12 = 60574.81 \quad <\dots \text{ change per month}$$

Thirdly, we devide 16388.99 by 60574.81 to see after how many months will that value become equal to 0.

$$16388.99 / 60574.81 = 0.27$$

Therefore, the payback period is 3 years and 0.27 months. See the chart below.

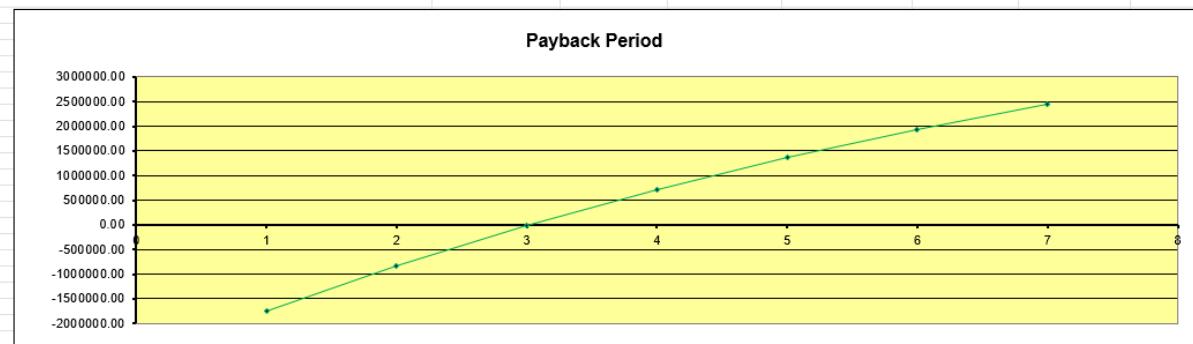


Figure 64 Cost Management - Payback Period

## Visual Representation - Baseline Cost Report

The next figure outlines the Baseline Cost report which describes the baseline cost, cost and the actual cost that have been paid until the report generates moment. This report gives the project manager the opportunity to monitor the project budget for any changes that may occur in any of the project phases.

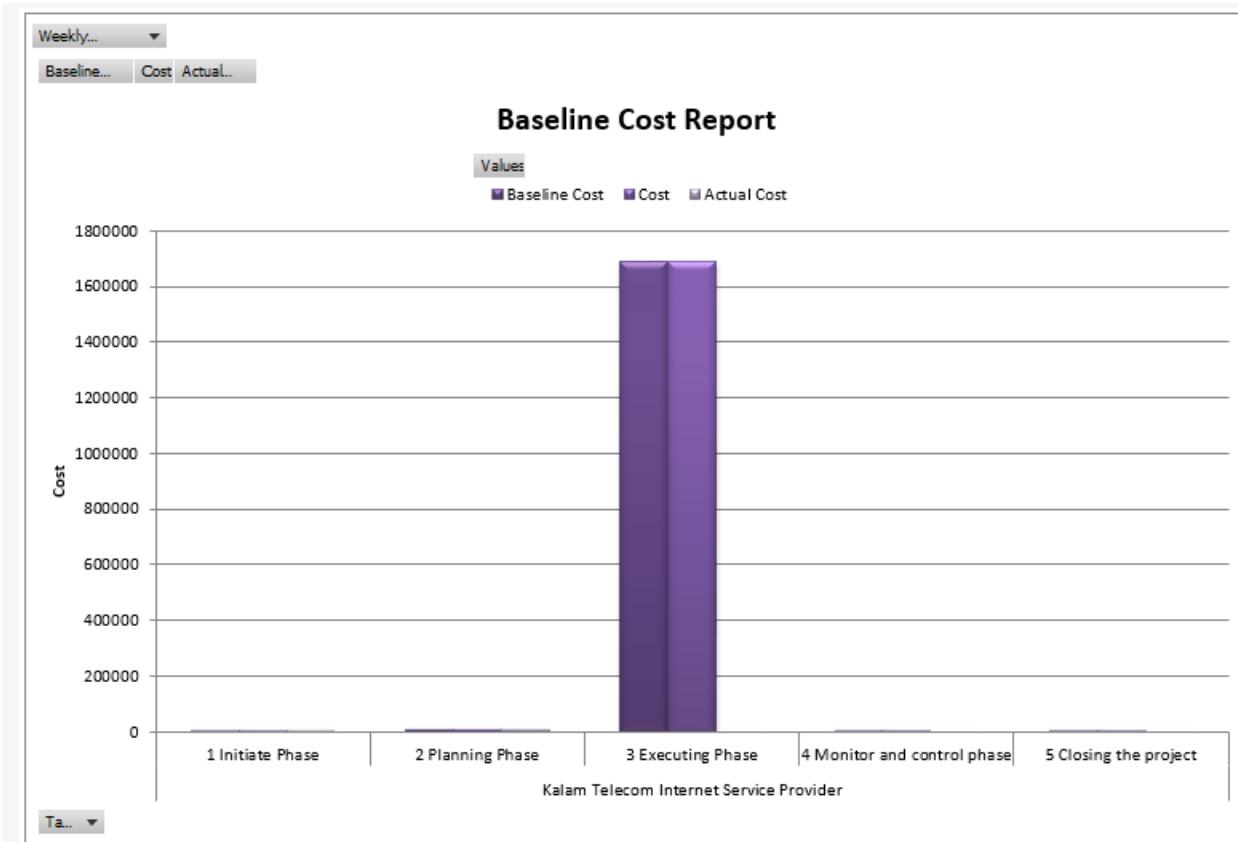


Figure 65 Cost Management - Baseline Cost Report

## Visual Representation - Budget Cost Report

The bar chart figure below shows the project budget cost throughout the life of the project. The report outlines the budget, baseline cost, cost and actual cost for each quarter. This graph report allows the project manager to monitor and observe the project budget during the project lifecycle.

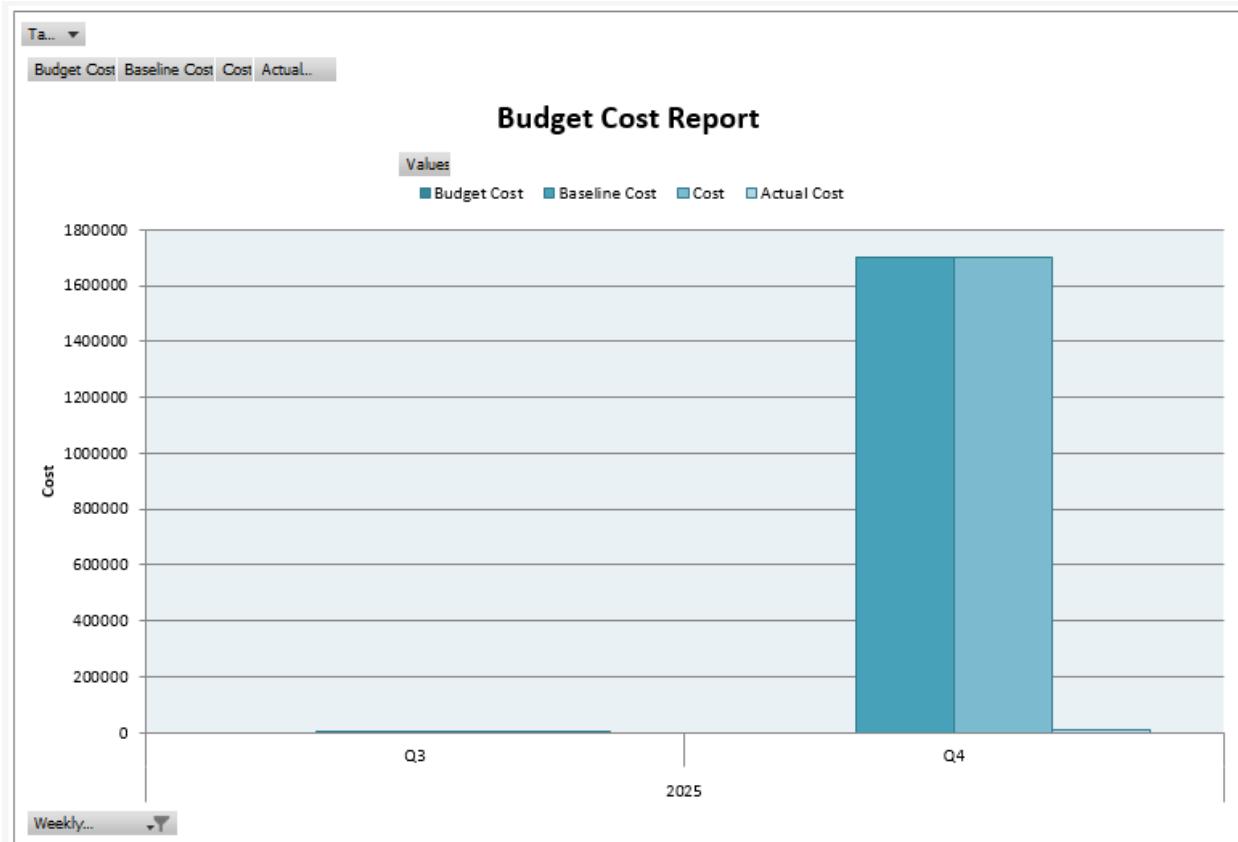


Figure 66 Cost Management - Budget Cost Report

## Cost Variance and Cost Performance Index

The below figures show the cost variance and cost performance index which both of them are used to monitor the project cost. The Cost variance and cost performance index helps the project manager to monitor and observe the cost of each task in the project to ensure that the costs are within the decided budget.

	Task Name	Duration	Start	Finish	CV	CPI	Adv
0	▫ Kalam Telecom Internet Service Provider	63.81 days	Wed 10/1/25	Mon 12/29/25	\$0.00	1	
1	▫ 1 Initiate Phase	7 days	Wed 10/1/25	Thu 10/9/25	\$0.00	1	
2	▫ 1.1 Overview of the client	0.63 days	Wed 10/1/25	Wed 10/1/25	\$0.00	1	
3	1.1.1 Stakeholders identification	1.5 hrs	Wed 10/1/25	Wed 10/1/25	\$0.00	1	
4	1.1.2 Client background	1 hr	Wed 10/1/25	Wed 10/1/25	\$0.00	1	
5	1.1.3 Current systems	1 hr	Wed 10/1/25	Wed 10/1/25	\$0.00	1	
6	1.1.4 Related procedures amd policies	1.5 hrs	Wed 10/1/25	Wed 10/1/25	\$0.00	1	
7	▫ 1.2 General information	1.31 days	Wed 10/1/25	Thu 10/2/25	\$0.00	1	
8	1.2.1 Project purpose	3 hrs	Wed 10/1/25	Wed 10/1/25	\$0.00	1	
9	1.2.2 Project description	1.5 hrs	Thu 10/2/25	Thu 10/2/25	\$0.00	1	
10	1.2.3 schedule summary	2 hrs	Thu 10/2/25	Thu 10/2/25	\$0.00	1	
11	1.2.4 Budget summary	2 hrs	Thu 10/2/25	Thu 10/2/25	\$0.00	1	
12	1.2.5 Project success criteria	2 hrs	Thu 10/2/25	Thu 10/2/25	\$0.00	1	
13	▫ 1.3 Project context	1.31 days	Thu 10/2/25	Mon 10/6/25	\$0.00	1	
14	1.3.1 Business need, opportunity or problem	2 hrs	Thu 10/2/25	Sun 10/5/25	\$0.00	1	
15	1.3.2 Business objective	1 hr	Sun 10/5/25	Sun 10/5/25	\$0.00	1	
16	1.3.3 Business assumption	2 hrs	Sun 10/5/25	Sun 10/5/25	\$0.00	1	
17	1.3.4 Business constraints	3 hrs	Sun 10/5/25	Sun 10/5/25	\$0.00	1	
18	1.3.5 Business Risks	2.5 hrs	Sun 10/5/25	Mon 10/6/25	\$0.00	1	
19	▫ 1.4 LESPI	1.5 days	Mon 10/6/25	Tue 10/7/25	\$0.00	1	
20	1.4.1 Legal Issues	3 hrs	Mon 10/6/25	Mon 10/6/25	\$0.00	1	
21	1.4.2 Ethical issues	3 hrs	Mon 10/6/25	Mon 10/6/25	\$0.00	1	
22	1.4.3 Social issues	3 hrs	Tue 10/7/25	Tue 10/7/25	\$0.00	1	
23	1.4.4 Professional issues	3 hrs	Tue 10/7/25	Tue 10/7/25	\$0.00	1	
24	1.5 Project charter	0 days	Thu 10/9/25	Thu 10/9/25	\$0.00	0	

Figure 67 Cost Variance and Cost Performance Index - Initiate Phase

Task Name	Duration	Start	Finish	CV	CPI	Ad
« 2 Planning Phase	18 days	Sun 10/12/25	Tue 11/4/25	\$0.00	1	
« 2.1 Scope Management	3.06 days	Sun 10/12/25	Wed 10/15/25	\$0.00	1	
2.1.1 Problem Anaylsis - Ishikawa Diagram	3.5 hrs	Sun 10/12/25	Sun 10/12/25	\$0.00	1	
« 2.1.2 Requirements Gathering	0.5 days	Sun 10/12/25	Sun 10/12/25	\$0.00	1	
2.1.2.1 Interview Plan	1 hr	Sun 10/12/25	Sun 10/12/25	\$0.00	1	
2.1.2.2 Functional requirements identificor	1 hr	Sun 10/12/25	Sun 10/12/25	\$0.00	1	
2.1.2.3 Non-Functional requirements identific	1 hr	Sun 10/12/25	Sun 10/12/25	\$0.00	1	
2.1.2.4 Design requirements identification	1 hr	Sun 10/12/25	Sun 10/12/25	\$0.00	1	
« 2.1.3 Plan Scope management	0.81 days	Sun 10/12/25	Mon 10/13/25	\$0.00	1	
2.1.3.1 Scope Introduction	0.5 hrs	Sun 10/12/25	Sun 10/12/25	\$0.00	1	
2.1.3.2 Scope definition	0.5 hrs	Mon 10/13/25	Mon 10/13/25	\$0.00	1	
2.1.3.4 Scope statement	0.5 hrs	Mon 10/13/25	Mon 10/13/25	\$0.00	1	
2.1.3.5 Scope verification	0.5 hrs	Mon 10/13/25	Mon 10/13/25	\$0.00	1	
2.1.3.6 Scope control	0.5 hrs	Mon 10/13/25	Mon 10/13/25	\$0.00	1	
2.1.3.7 Work breakdown structure	0.5 days	Mon 10/13/25	Mon 10/13/25	\$0.00	1	
« 2.1.4 Decision analysis	1.31 days	Mon 10/13/25	Wed 10/15/25	\$0.00	1	
2.1.4.1 COTS matrix	4 hrs	Mon 10/13/25	Tue 10/14/25	\$0.00	1	
2.1.4.2 COTS weighted matrix	2.5 hrs	Tue 10/14/25	Tue 10/14/25	\$0.00	1	
2.1.4.3 Resource sheet (Entry view)	1 hr	Tue 10/14/25	Tue 10/14/25	\$0.00	1	
2.1.4.4 Resource sheet (Cost view)	1 hr	Tue 10/14/25	Tue 10/14/25	\$0.00	1	
2.1.4.5 Cost benefit analysis	2 hrs	Tue 10/14/25	Wed 10/15/25	\$0.00	1	
2.1.5 Scope management submission	0 days	Wed 10/15/25	Wed 10/15/25	\$0.00	0	
« 2.2 Human Resource Management	0.75 days	Wed 10/15/25	Wed 10/15/25	\$0.00	1	
2.2.1 Set responsibilities	2 hrs	Wed 10/15/25	Wed 10/15/25	\$0.00	1	
2.2.2 Create responsibilities assigbnebt matrix	3 hrs	Wed 10/15/25	Wed 10/15/25	\$0.00	1	
2.2.3 Resource histogram	1 hr	Wed 10/15/25	Wed 10/15/25	\$0.00	1	
2.2.4 Human resource management submission	0 days	Wed 10/15/25	Wed 10/15/25	\$0.00	0	
« 2.3 Schedule Management	1.69 days	Wed 10/15/25	Sun 10/19/25	\$0.00	1	
2.3.1 Plan Schedule management	3 hrs	Wed 10/15/25	Thu 10/16/25	\$0.00	1	
2.3.2 Define Activity	3.5 hrs	Thu 10/16/25	Thu 10/16/25	\$0.00	1	
2.3.3 Sequence activities	2 hrs	Thu 10/16/25	Thu 10/16/25	\$0.00	1	
2.3.4 Esitmate activity duration	1 hr	Thu 10/16/25	Thu 10/16/25	\$0.00	1	

Figure 68 Cost Variance and Cost Performance Index - Planning Phase Part 1

Task Name	Duration	Start	Finish	CV	CPI
2.3.5 Develop the schedule	4 hrs	Sun 10/19/25	Sun 10/19/25	\$0.00	1
2.3.6 Schedule management submission	0 days	Sun 10/19/25	Sun 10/19/25	\$0.00	0
▫ 2.4 Cost Management	<b>0.75 days</b>	<b>Sun 10/19/25</b>	<b>Mon 10/20/25</b>	<b>\$0.00</b>	<b>1</b>
2.4.1 Plan cost management	2 hrs	Sun 10/19/25	Sun 10/19/25	\$0.00	1
2.4.2 Cost esitmation	2 hrs	Sun 10/19/25	Sun 10/19/25	\$0.00	1
2.4.3 Budget determinitaion	2 hrs	Mon 10/20/25	Mon 10/20/25	\$0.00	1
2.4.4 Cost management submission	0 days	Mon 10/20/25	Mon 10/20/25	\$0.00	0
▫ 2.5 Communication Management	<b>0.56 days</b>	<b>Mon 10/20/25</b>	<b>Mon 10/20/25</b>	<b>\$0.00</b>	<b>1</b>
2.5.1 Stakeholders communication analysis	2 hrs	Mon 10/20/25	Mon 10/20/25	\$0.00	1
2.5.2 Expectations management matrix	1 hr	Mon 10/20/25	Mon 10/20/25	\$0.00	1
2.5.3 Stakeholders management strategy and inf	1.5 hrs	Mon 10/20/25	Mon 10/20/25	\$0.00	1
2.5.4 Communication management submission	0 days	Mon 10/20/25	Mon 10/20/25	\$0.00	0
▫ 2.6 Procurement Management	<b>0.38 days</b>	<b>Mon 10/20/25</b>	<b>Tue 10/21/25</b>	<b>\$0.00</b>	<b>1</b>
2.6.1 Plan Procurement management plan	1.5 hrs	Mon 10/20/25	Mon 10/20/25	\$0.00	1
2.6.2 Conduct procurements	1.5 hrs	Tue 10/21/25	Tue 10/21/25	\$0.00	0
2.6.3 Procurement management submission	0 days	Tue 10/21/25	Tue 10/21/25	\$0.00	0
▫ 2.7 Quality Management	<b>0.81 days</b>	<b>Tue 10/21/25</b>	<b>Tue 10/21/25</b>	<b>\$0.00</b>	<b>0</b>
▫ 2.7.1 Plan quality management	<b>0.44 days</b>	<b>Tue 10/21/25</b>	<b>Tue 10/21/25</b>	<b>\$0.00</b>	<b>0</b>
2.7.1.1 Quality requirements matrix	3.5 hrs	Tue 10/21/25	Tue 10/21/25	\$0.00	0
▫ 2.7.2 Perform quality assurance	<b>0.38 days</b>	<b>Tue 10/21/25</b>	<b>Tue 10/21/25</b>	<b>\$0.00</b>	<b>0</b>
2.7.2.1 Qaulity assurance test	3 hrs	Tue 10/21/25	Tue 10/21/25	\$0.00	0
2.7.3 Quality management submission	0 days	Tue 10/21/25	Tue 10/21/25	\$0.00	0
▫ 2.8 Risk Management	<b>1.38 days</b>	<b>Wed 10/22/25</b>	<b>Thu 10/23/25</b>	<b>\$0.00</b>	<b>0</b>
2.8.1 Plan risk management	1.5 hrs	Wed 10/22/25	Wed 10/22/25	\$0.00	0
2.8.2 Risk Report	3.5 hrs	Wed 10/22/25	Wed 10/22/25	\$0.00	0
2.8.3 Perform risk analysis	4 hrs	Wed 10/22/25	Thu 10/23/25	\$0.00	0
2.8.4 Plan risk responses	2 hrs	Thu 10/23/25	Thu 10/23/25	\$0.00	0
2.8.5 Risk managemrnt submission	0 days	Thu 10/23/25	Thu 10/23/25	\$0.00	0
2.9 Submission of Project plan document	0 days	Tue 11/4/25	Tue 11/4/25	\$0.00	0

Figure 69 Cost Variance and Cost Performance Index - Planning Phase Part 2

Task Name	Duration	Start	Finish	CV	CPI	Add New
↳ <b>3 Executing Phase</b>	<b>30.31 days</b>	<b>Wed 11/5/25</b>	<b>Wed 12/17/25</b>	<b>\$0.00</b>	<b>0</b>	
↳ <b>3.1 Designing phase</b>	<b>10.88 days</b>	<b>Wed 11/5/25</b>	<b>Wed 11/19/25</b>	<b>\$0.00</b>	<b>0</b>	
↳ <b>3.1.1 Design the topology</b>	<b>2.5 days</b>	<b>Wed 11/5/25</b>	<b>Sun 11/9/25</b>	<b>\$0.00</b>	<b>0</b>	
3.1.1.1 Design network topology	1 day	Wed 11/5/25	Wed 11/5/25	\$0.00	0	
3.1.1.2 Plan IP addressing scheme	4 hrs	Thu 11/6/25	Thu 11/6/25	\$0.00	0	
3.1.1.3 Determine the segments in the network	8 hrs	Thu 11/6/25	Sun 11/9/25	\$0.00	0	
↳ <b>3.1.2 Design routing structure</b>	<b>1.81 days</b>	<b>Sun 11/9/25</b>	<b>Tue 11/11/25</b>	<b>\$0.00</b>	<b>0</b>	
3.1.2.1 Select and design internal routing protocol	1.5 hrs	Sun 11/9/25	Sun 11/9/25	\$0.00	0	
3.1.2.2 Design external routing protocol	5 hrs	Sun 11/9/25	Mon 11/10/25	\$0.00	0	
3.1.2.3 Design static routing and route summarization	1 day	Mon 11/10/25	Tue 11/11/25	\$0.00	0	
↳ <b>3.1.3 MPLS and QoS Design</b>	<b>2.06 days</b>	<b>Tue 11/11/25</b>	<b>Thu 11/13/25</b>	<b>\$0.00</b>	<b>0</b>	
3.1.3.1 Identify the core devices (P, PE, C and L)	1.5 hrs	Tue 11/11/25	Tue 11/11/25	\$0.00	0	
3.1.3.2 Define MPLS label distribution method	4 hrs	Tue 11/11/25	Tue 11/11/25	\$0.00	0	
3.1.3.3 Plan VRF, RD and RT	3 hrs	Wed 11/12/25	Wed 11/12/25	\$0.00	0	
3.1.3.4 Classify traffic and bandwidth allocation	1 day	Wed 11/12/25	Thu 11/13/25	\$0.00	0	
↳ <b>3.1.4 Security and redundancy design</b>	<b>4.5 days</b>	<b>Thu 11/13/25</b>	<b>Wed 11/19/25</b>	<b>\$0.00</b>	<b>0</b>	
3.1.4.1 Define AAA	1.5 days	Thu 11/13/25	Sun 11/16/25	\$0.00	0	
3.1.4.2 Determine the route map filtering	2 days	Sun 11/16/25	Tue 11/18/25	\$0.00	0	
3.1.4.3 Define redundant links	1 day	Tue 11/18/25	Wed 11/19/25	\$0.00	0	
3.1.5 Submit design documents	0 days	Wed 11/19/25	Wed 11/19/25	\$0.00	0	
↳ <b>3.2 Implementing phase</b>	<b>14.56 days</b>	<b>Wed 11/19/25</b>	<b>Wed 12/10/25</b>	<b>\$0.00</b>	<b>0</b>	
↳ <b>3.2.1 Hardware preparation</b>	<b>1.63 days</b>	<b>Wed 11/19/25</b>	<b>Sun 11/23/25</b>	<b>\$0.00</b>	<b>0</b>	
3.2.1.1 Power& preparing the devices	2 hrs	Wed 11/19/25	Thu 11/20/25	\$0.00	0	
3.2.1.2 Update the firmware	8 hrs	Thu 11/20/25	Sun 11/23/25	\$0.00	0	
3.2.1.3 Verify physical connections	3 hrs	Sun 11/23/25	Sun 11/23/25	\$0.00	0	
↳ <b>3.2.2 Initial network configuration</b>	<b>2.38 days</b>	<b>Sun 11/23/25</b>	<b>Tue 11/25/25</b>	<b>\$0.00</b>	<b>0</b>	
3.2.2.1 Assign hostnames	4 hrs	Sun 11/23/25	Sun 11/23/25	\$0.00	0	
3.2.2.2 Assign IP address and subnet mask	1.5 days	Mon 11/24/25	Tue 11/25/25	\$0.00	0	
3.2.2.3 Configure management access	3 hrs	Tue 11/25/25	Tue 11/25/25	\$0.00	0	
↳ <b>3.2.3 Configure routing protocol</b>	<b>6 days</b>	<b>Tue 11/25/25</b>	<b>Wed 12/3/25</b>	<b>\$0.00</b>	<b>0</b>	
3.2.3.1 Configure OSPF protocol	8 hrs	Tue 11/25/25	Wed 11/26/25	\$0.00	0	

Figure 70 Cost Variance and Cost Performance Index - Executing Phase Part 1

Task Name	Duration	Start	Finish	CV	CPI	Add
3.2.3.2 Configure EIGRP protocol	8 hrs	Wed 11/26/25	Thu 11/27/25	\$0.00	0	
3.2.3.3 Configure BGP protocol	2 days	Thu 11/27/25	Mon 12/1/25	\$0.00	0	
3.2.3.4 Configure route maps and redistributio	1 day	Mon 12/1/25	Tue 12/2/25	\$0.00	0	
3.2.3.5 Configure static routes	1 day	Tue 12/2/25	Wed 12/3/25	\$0.00	0	
▲ 3.2.4 Configure MPLS and QoS	3.56 days	Wed 12/3/25	Tue 12/9/25	\$0.00	0	
3.2.4.1 Deploying MPLS	1 day	Wed 12/3/25	Thu 12/4/25	\$0.00	0	
3.2.4.2 Configure MPLS VPN	2 days	Thu 12/4/25	Mon 12/8/25	\$0.00	0	
3.2.4.3 Integrate quality of service on MPLS VF	4.5 hrs	Mon 12/8/25	Tue 12/9/25	\$0.00	0	
▲ 3.2.5 Configure network services	1 day	Tue 12/9/25	Wed 12/10/25	\$0.00	0	
3.2.5.1 Configure network address translation	3.5 hrs	Tue 12/9/25	Tue 12/9/25	\$0.00	0	
3.2.5.2 Configure point-to-point connections	3.5 hrs	Tue 12/9/25	Wed 12/10/25	\$0.00	0	
3.2.5.3 Configure authentication, authorizatio	1 hr	Wed 12/10/25	Wed 12/10/25	\$0.00	0	
3.2.6 Submit the implementation documents	0 days	Wed 12/10/25	Wed 12/10/25	\$0.00	0	
▲ 3.3 Testing and verifying phase	4.88 days	Wed 12/10/25	Wed 12/17/25	\$0.00	0	
▲ 3.3.1 Basic testing	0.75 days	Wed 12/10/25	Thu 12/11/25	\$0.00	0	
3.3.1.1 Verify intial configuration	4 hrs	Wed 12/10/25	Wed 12/10/25	\$0.00	0	
3.3.1.2 Connectivity testing	2 hrs	Wed 12/10/25	Thu 12/11/25	\$0.00	0	
▲ 3.3.2 Routing protocol testing	2 days	Thu 12/11/25	Mon 12/15/25	\$0.00	0	
3.3.2.1 Test OSPF adjacency	4 hrs	Thu 12/11/25	Thu 12/11/25	\$0.00	0	
3.3.2.2 Testing EIGRP adjacency	4 hrs	Thu 12/11/25	Sun 12/14/25	\$0.00	0	
3.3.2.3 Testing BGP neighbor	4 hrs	Sun 12/14/25	Sun 12/14/25	\$0.00	0	
3.3.2.4 Testing Static routes connections	4 hrs	Sun 12/14/25	Mon 12/15/25	\$0.00	0	
▲ 3.3.3 MPLS and QoS testing	1.44 days	Mon 12/15/25	Tue 12/16/25	\$0.00	0	
3.3.3.1 Tesing MPLS	2.5 hrs	Mon 12/15/25	Mon 12/15/25	\$0.00	0	
3.3.3.2 Testing MPLS VPN connectivity	2 hrs	Mon 12/15/25	Mon 12/15/25	\$0.00	0	
3.3.3.3 Validate and test QoS traffic	4 hrs	Mon 12/15/25	Tue 12/16/25	\$0.00	0	
3.3.3.2 measure the jitter, latency and packet	3 hrs	Tue 12/16/25	Tue 12/16/25	\$0.00	0	
▲ 3.3.4 Testing network services	0.69 days	Tue 12/16/25	Wed 12/17/25	\$0.00	0	
3.3.4.1 Testing the AAA	2 hrs	Tue 12/16/25	Tue 12/16/25	\$0.00	0	
3.3.4.2 Testing redundancy	3.5 hrs	Tue 12/16/25	Wed 12/17/25	\$0.00	0	
3.3.5 Submit the testing document	0 days	Wed 12/17/25	Wed 12/17/25	\$0.00	0	
3.4 Completion of the project	0 days	Wed 12/17/25	Wed 12/17/25	\$0.00	0	

Figure 71 Cost Variance and Cost Performance Index - Executing Phase Part 2

Task Name	Duration	Start	Finish	CV	CPI
4 Monitor and control phase	4.5 days	Wed 12/17/25	Tue 12/23/25	\$0.00	0
4.1 Monitor Project activities	0.5 days	Wed 12/17/25	Wed 12/17/25	\$0.00	0
4.2 Scope validation	0.5 days	Wed 12/17/25	Thu 12/18/25	\$0.00	0
4.3 Scope verification	0.5 days	Thu 12/18/25	Thu 12/18/25	\$0.00	0
4.4 Communication control	0.5 days	Thu 12/18/25	Sun 12/21/25	\$0.00	0
4.5 Schedule control	0.5 days	Sun 12/21/25	Sun 12/21/25	\$0.00	0
4.6 Cost control	0.5 days	Sun 12/21/25	Mon 12/22/25	\$0.00	0
4.7 Procurement control	0.5 days	Mon 12/22/25	Mon 12/22/25	\$0.00	0
4.8 Quality control	0.5 days	Mon 12/22/25	Tue 12/23/25	\$0.00	0
4.9 Risk control	0.5 days	Tue 12/23/25	Tue 12/23/25	\$0.00	0
4.10 Monitor and control report submission	0 days	Tue 12/23/25	Tue 12/23/25	\$0.00	0

Figure 72 Cost Variance and Cost Performance Index - Monitor and Control Phase

Task Name	Duration	Start	Finish	CV	CPI
5 Closing the project	4 days	Tue 12/23/25	Mon 12/29/25	\$0.00	0
5.1 Gather all required documents	4 hrs	Tue 12/23/25	Wed 12/24/25	\$0.00	0
5.2 Checklist all accomplished requirements	1 day	Wed 12/24/25	Thu 12/25/25	\$0.00	0
5.3 Obtain all stakeholders signatures	1.5 days	Thu 12/25/25	Sun 12/28/25	\$0.00	0
5.4 Archive all project files	4 hrs	Sun 12/28/25	Mon 12/29/25	\$0.00	0
5.5 Release all project resources	1.5 hrs	Mon 12/29/25	Mon 12/29/25	\$0.00	0
5.6 Notify stakeholders about project completion	0.5 hrs	Mon 12/29/25	Mon 12/29/25	\$0.00	0
5.7 Closing meeting	2 hrs	Mon 12/29/25	Mon 12/29/25	\$0.00	0
5.8 Submit the project	0 days	Mon 12/29/25	Mon 12/29/25	\$0.00	0

Figure 73 Cost Variance and Cost Performance Index - Closing Phase

# Quality Management Plan

## Introduction

Quality Management plan aims to define and outline the quality standards that will be followed during the project development. The quality management provides a clear guidelines that the development team will follow in order to ensure that the final product satisfies the client's needs and meets the required standards.

## Process

The quality management process used in this report consists of the following 3 steps:

- **Quality requirement planning:** it is a part of the planning phase of the project. This step is one of the important tasks in quality management since it ensures that the quality requirements that satisfy the client and following the standards are documented and identified.
- **Conduct quality assurance:** this step is set to evaluating the documented quality requirements and the output of that evaluation.
- **Controlling Quality:** this step is focused on monitoring and controlling and output that comes from the project to make sure that these outcomes are meeting the quality standards along with industry standards.

## Objectives

- All project deliverables must achieve the quality standards and measures.
- Prevent defects while developing the project
- Ensure compliance with standards

## Roles and Responsibilities

The table below represents the RACI table which stands for Responsible, Accountable, Consulted and Informed. The table will showcase the tasks and the level responsibility of each member when developing the quality management plan.

Responsible	Accountable	Consulted	Informed
Project Manager, Quality assurance Specialist	Project Manager	Client, Supervisor, Project Analyst	All stakeholders

Table 7 Quality Management RACI

## Approach

The approach will be used in this risk management process:

PIECES Framework: is a framework used to evaluate and improve the quality and performance of a project. The PIECES Framework stands for Performance, Information, Economic, Control, Efficiency and Services. Each of these categories will represent an area where quality improvements can be managed and achieved:

- **Performance:** focuses on the system and how it achieves its intended function and goal and how much it relevant to the client needs.
- **Information:** checks the accuracy, data and the timelines used in the project if its relevant to the client needs.
- **Economic:** keeping the cost reasonable and making sure that the resources are used wisely.
- **Control & Security:** identifying the surrounding environment and the level of safety so the project stays on track and meets the standards
- **Efficiency:** evaluating how the people, material and time are used in the project and making sure that nothing is being unnecessary wasted.
- **Services:** how well the final outcome of the product serves the needs of the client.

## Reports

### Quality Requirements Matrix

The bellow table outlines the quality requirements aspects that the product must follow and achieve them. The listed requirements below has been determined from the interview questions that have been conducted with the client and the requirement gathering. The quality requirements matrix is divided into six sections and each of these sections refer to a single part from the PECIES framework.

No.	Requirements including Standard and metric(s)	Standard Source	Achieved / Not Achieved
<b>Performance</b>			
1	MPLS must establish label-based connectivity between all core routers with at least 100% LSP establishment	Client	-
2	Internal routing protocol like OSPF/EIGRP and external routing protocol like BGP must update their routing table within a maximum of 20 seconds	Client	-
3	BGP peering sessions must be established with all BGP peers without any issues within a maximum 2 minutes	Client	-
4	QoS must guarantee a minimum 1 Mbps throughput for traffic that classified as high priority and 99% uptime under load	Client	-
5	MPLS label distribution protocol must be configured and active on all routers	Client	-
<b>Information</b>			
6	The Syslog server must store the logs for a minimum 12 months	Client	-
7	Documentation must include network topology, addressing plan and route summarization.	Client	-
8	Documentation updates must happen within a maximum of 24 hours after any approved changes in the deployed configuration	Client	-
<b>Economic</b>			
9	Project cost variance must remain within maximum of 10% of the approved costs	Client	-
<b>Control &amp; Security</b>			
10	AAA Server must cover all critical networking devices	Client	-
11	SSH must be used for all as the default secure method on all routers	Client	-
12	The configuration files must follow the standard procedures of documenting	Client	-

<b>13</b>	MPLS VPN must ensure 0% cross traffic between customer	Client	-
<b>Efficiency</b>			
<b>14</b>	Rerouting must happen within at least 15 seconds after a link failure	Client	-
<b>15</b>	Route summarization must reduce the routing table by at least 30%	Client	-
<b>Services</b>			
<b>16</b>	Service must not be interrupted while adding the network routers and equipment's	Client	-
<b>17</b>	All staff members must pass the post-training test with a minimum of 80%	Client	-

**Table 8 Quality Requirements Matrix**

## Quality Assurance Test Cases

The table below displays the test that project team will conduct to test and evaluate the product. The test cases will be helpful for the project team to perform quality control and ensuring that the product meets the quality requirements that has been documented in the quality requirement matrix. The test cases below define multiple scenarios that will be used to assess the system's features and functionality. Furthermore, the table shows the function tested and a brief description of the test case along with the expected and actual results.

No.	Function Tested	Test Case Description	Expected Results	Actual Results	Pass/Fail
1	MPLS Connectivity	Verify the MPLS connection between all core routers	All core routers must form label-switched paths with no missing labels.	-	Pass/Fail
2	Routing Updates	Test the OSPF/EIGRP and BGP recalculate routes after any changes in the topology	All routers must update their routes and restore connectivity with other routers.	-	Pass/Fail
3	BGP Peering	Validate and check the BGP sessions between Autonomous systems	All BGP peers must establish an establishment state within 2 minutes	-	Pass/Fail
4	QoS Performance & Throughput	Check if the QoS maintains and keep traffic prioritization under load	High priority traffic must maintain at least 1 Mbps bandwidth even under load.	-	Pass/Fail
5	MPLS LDP Operations	Test the label distribution features	All routers should have active LDP sessions	-	Pass/Fail
6	Logging storing	Review the logs from the syslog server	Syslog server must retrieve logs from the previous 12 months	-	Pass/Fail
7	Documentation Completeness	Check all the technical documentation that is related to the infrastructure	All of the technical documentation must be fully completed covering all devices and links	-	Pass/Fail
8	Documentation Updates	Updating the configuration files if any changes occur in the deployed devices	All backup configurations must be updated within 24 hours of any approved changes.	-	Pass/Fail
9	Budget control	Test and compare the estimated project budget with the actual budget	cost variance must remain within maximum of 10%	-	Pass/Fail

<b>10</b>	AAA Security	Confirms that AAA authenticates and accounting on all routers	All of the devices authenticate through the AAA server	-	Pass/Fail
<b>11</b>	Secure Access	Attempt to connect to the router via SSH	SSH connection must be successful, and telnet should be denied	-	Pass/Fail
<b>12</b>	Configuration Standard compliance	Review the network configuration files and evaluate them against the industry standards	Configuration files must be fully compliance with the standard or cisco standard	-	Pass/Fail
<b>13</b>	Customer Isolation	Test the VRF and MPLS VPN for separation between customer A and B	No cross traffic between customer A and customer B	-	Pass/Fail
<b>14</b>	Network Failover & Recovery	Simulate link failure to verify redundancy	Traffic reroutes to the redundant link with 15 seconds	-	Pass/Fail
<b>15</b>	Route Summarization	Measure how much is the reduction in the routing table	Routing entries should be reduced by at least 30%	-	Pass/Fail
<b>16</b>	Scalability	Adding a new router or networking device during live operation	The integration process should be completed without any downtime to the services	-	Pass/Fail
<b>17</b>	Staff Training	Evaluate all staff training assessment results and marks	All training scores must at least score 80% and above	-	Pass/Fail

Table 9 Quality Assurance Test Cases

# Human Resource Management Plan

## Introduction

Human resources management is the process of identifying human resources and making sure that they have the required skills and knowledge for the project. Human resources management ensures that tasks are distributed effectively to each member alongside the responsibilities that come with the position. Furthermore, this approach allows the project manager to record the performance of each member to ensure that the assigned position is within the members capabilities. In addition, it helps the project manager to easily identify the skill gap between human resources and the tasks which may lead to training.

## Process

The human resource process that was used in the development of this project human resource management plan consists of four phases:

1. **Human resource planning:** This process involves listing all the required roles, positions, skills and responsibilities to start implementing the project. The outcome of this process is the human resource plan
2. **Acquiring project members:** This process involves allocating the required resources to start working on the project. The outcome of this process can be planning updates, staff assignments and resource calendar.
3. **Developing project team:** This process focuses on identifying a group of members that have certain skills so that we can identify who needs additional training to improve their performance. The outcome of this phase is to assess the team's performance.
4. **Monitoring and controlling** project team: This process involves tracking and recording all members progress and performance and ensuring best environment by providing regular feedback and motivation to the project members.

## Objectives

The main goal of this project human resource management is:

- Assign the right people to the right tasks
- Motivate team members
- Monitor team member performance

## Roles and Responsibilities

The table below represents the RACI table which stands for Responsible, Accountable, Consulted and Informed. The table will showcase the tasks and the level responsibility of each member when developing human resource management.

Responsible	Accountable	Consulted	Informed
Project Manager	Project Manager	Client, Supervisor, Project Analyst	All stakeholders

Table 10 Human Resource Management RACI

## Approach

There are two approaches used to follow human resource management in this project:

### 1. Responsibility assignment matrix (RAM) and RACI table:

Using this approach highlights the roles and responsibilities of each task in the project. This way every member of the team will know which one is responsible, accountable, consulted and informed. In addition, it will address training program if needed.

### 2. Visual reports:

This approach depends on the visuals generated reports for resource work summary and resource work availability by utilizing the visual reports feature in MS project.

## Reports

### Responsibility assignment matrix

The following table represents the required human resource for each of these tasks in the execute phase of this project alongside with a clear detailed description the roles and who is responsible, accountable, consulted and informed in addition to the training programs if needed.

Task / Work Package / Activity	Skill required	Training Required	R	A	C	I
<b>Design the topology</b>	Network architecture, logical/physical topology design, redundancy planning	No	Network Engineer (Core)	Project Manager	Project Manager, Network Engineer (Edge)	Stakeholders
<b>Design routing structure</b>	Interior & exterior routing protocols, redistribution	No	Network Engineer (Core)	Project Manager	Network Engineer (Edge), Project Manager	Stakeholders
<b>MPLS and QoS Design</b>	MPLS VPN, LDP, QoS classification, Traffic engineer	Yes	Network Engineer (Core), Network Engineer (Edge)	Project Manager	Project Manager, Project Analyst	Stakeholders
<b>Basic device configuration</b>	Initial setup, firmware update	No	Network Engineer (Core)	Project Manager	Network Engineer (Edge), Project Manager	Stakeholders
<b>Configure routing protocol</b>	OSPF, EIGRP, BGP configuration	No	Network Engineer (Core), Network Engineer (Edge)	Project Manager	Project Manager, Project Analyst	Stakeholders
<b>Configure MPLS</b>	LDP, VRF, RD/RT configuration	Yes	Network Engineer (Core)	Project Manager	Network Engineer (Edge), Project Manager	Stakeholders

<b>Integration of QoS into MPLS</b>	QoS on MPLS VPN, bandwidth management	Yes	Network Engineer (Edge)	Project Manager	Project Manager, Quality Assurance Specialist, Network Engineer (Core)	Stakeholders
<b>Configure network services</b>	NAT, AAA, PPP, Syslog, NTP	No	Security Specialist, Network Engineer (Edge)	Project Manager	Project Manager, Project Analyst, Network Engineer (Core)	Stakeholders
<b>Testing the network</b>	performance testing	No	Tester, Quality assurance specialist	Project Manager	Network Engineer (Edge), Project Manager, Network Engineer (Core)	Stakeholders

Table 11 Human Resource Management - Responsibility Assignment Matrix

## Resource Histogram – Resource Work Summary

The following figure displays the resource work summary report which represents the summary of the work progress and remaining available work of the project. The chart is divided into 8 sections, each section represents a team member with its available work, actual work and remaining work. This kind of report helps the project manager to monitor the progress of each individual team member.

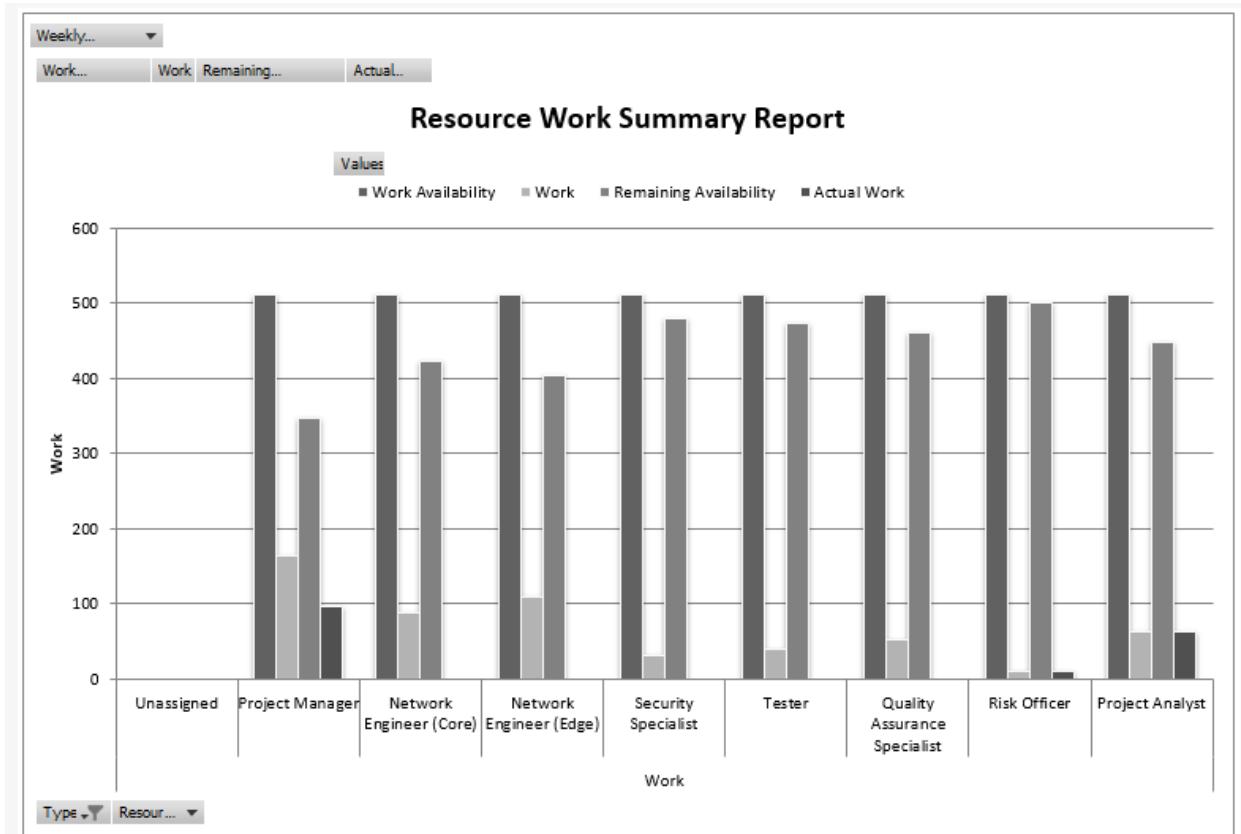


Figure 74 Human Resource Management - Resource Work Summary

## Resource Histogram – Resource Availability Summary

The below figure illustrates the recourse work availability report which demonstrates the work that need to be done during certain time, the remaining work and the work that has been done. This report gives the project manager a summary of the work progress of all members in the project.



Figure 75 Human Resource Management - Resource Work Availability



# Communication Management Plan

## Introduction

Communication management is the process that focus on mapping the required communication during the project entire lifecycle. It ensures that information is properly sent, received and understood by all members of this project. Communication plan is one of the main pillars of successful project management. The communication plan will lay down the specific updating methods and formats alongside the responsible members for each communication format ensuring clear understanding and accountability of this process. The approach that will be applied on this project for communication management plan will include defining the communication channels, regularly updates and assigning roles and responsibilities to ensure that the information flows perfectly throughout the project life cycle.

## Process

The communication process that was used in this project consists of three steps:

- **Identifying stakeholders:** identify all stakeholders and other parties in the project and determine the range of information for each stakeholder member.
- **Channel priority:** Prioritize and identify the channels into group to make it easier to manage and ensure effective communication.
- **Communication Planning:** Identifying the correct and appropriate type of channels, appropriate format of communication and timing and schedule.

## Objectives

- Discussing project issues
- Regularly updating the stakeholder
- Exchanging important information between team members

## Roles and Responsibilities

The table below represents the RACI table which stands for Responsible, Accountable, Consulted and Informed. The table will showcase the tasks and the level responsibility of each member when developing the communication management plan.

Responsible	Accountable	Consulted	Informed
Project Manager	Project Manager	Client, Supervisor, Project Analyst	All stakeholders

Table 12 Communication Management RACI

## Approach

The communication plan uses three approaches to achieve the best result:

1. **Stakeholder communications analysis:** a table that states all project stakeholders while identifying the method of communication for each stakeholder in addition to the format of the communication.
2. **Expectations Management Matrix:** a document that classifies and prioritizes each aspect of the project (Time, Budget, Quality, Scope and Customer Acceptance).
3. **Stakeholders Management Strategy and Influence Matrix:** document that have all the stakeholders, their roles in the project and their level of interest in the project.

## Report

### Stakeholder communication analysis

The following table demonstrates a fully conducted analysis of communication between the stakeholders and project manager. This analysis ensures that each stakeholder receives an update according to their communication way.

Stakeholder	What needs to be communicated	Format/method	Due
Advisor	Weekly Meetings	Meeting Via MS Teams	Every week, Sunday from 12:30 to 1:00
Client, Advisor	Charter	Digital Submission in PDF or Word Format	November 4 <sup>th</sup> Final Charter Submission Date
Client, Advisor	Plan	Digital Submission in PDF or Word Format	November 4 <sup>th</sup> Final Plan Submission Date

<b>Client, Advisor</b>	Design Document	Digital Submission in PDF or Word Format	December 28 <sup>th</sup> Final Design Submission Date
<b>Client, Advisor</b>	Thesis Document	Digital Submission in PDF or Word Format	December 28 <sup>th</sup> Final Thesis Submission Date
<b>All stakeholders</b>	Product	Digital Submission in ZIP File	December 28 <sup>th</sup> Final Product Submission Date
<b>All stakeholders</b>	Demonstration	Demonstrations will be Conducted Physically	December 29 <sup>th</sup> – 30 <sup>th</sup> Demonstration Date

Table 13 Communication Management - Stakeholder Communication Analysis

## Expectations Management Matrix

The expectation management matrix explains each aspect of the project measure of success alongside with the priority. The ranking system is measured from 1 to 5, where 5 has the highest priority indicating that the measure of success is important to the stakeholders and the project.

Measure of Success	Priority (1-5)	Stakeholders Expectations
<b>Time</b>	5	There is no flexibility for delays. The project must be completed within the agreed implementation period.
<b>Budget</b>	3	Budget consideration is important to ensure cost control but, client is willing to allocate additional funds if necessary.
<b>Quality</b>	5	The client requires a high-quality project that meets the industry standards and fulfils their needs and requirements.
<b>Scope</b>	5	The project must follow and meet all the requirements mentioned on the scope and clients should be satisfied with the final product.
<b>Customer Acceptance</b>	5	The final product should satisfy the customer and alongside the work progress should be accepted by the client.

Table 14 Communication Management - Expectation Management Matrix

## Stakeholders Management Strategy and Influence Matrix

The table below outlines all stakeholders that are involved in the project, alongside with their influence level and the contribution that they have towards the project's success.

Stakeholder	Role	Internal	Level of Interest HML	Potential Management Strategy
<b>Wakil Sarfaraz</b>	Advisor	Internal	H	Sharing regular updates, feedback and recommendations and involve in some decision making.
<b>IT Department of Kalam Telecom</b>	Client	Internal	H	Ensure constant updates, reviews and demos of the product to confirm the needed requirements.
<b>CEO of Kalam Telecom</b>	Sponsor	Internal	H	Satisfaction throughout the milestones finance reporting and reporting of the project progress.
<b>Hasan Bahzad</b>	Project manager	Internal	H	Manages and supervise all of the project development phases and Acts as the central hubs for communication between the team and all stakeholders.
<b>Hasan Ahmadi</b>	Network Engineer (Core)	Internal	H	Involves deeply in designing and implementing phases in addition to that maintaining full and open communication with the network engineer edge for any consultant.
<b>Salman Ali</b>	Network Engineer (Edge)	Internal	H	Collaborates with the network engineer core to perform end-to-end testing alongside the implementing of the external side services.
<b>Raju Kumar</b>	Security Specialist	Internal	M	Participating in the designing and testing phases provides help in determining and creating some of the aspects of the infrastructure.
<b>Mohammed Zuhair</b>	Tester	Internal	M	Mainly conduct test cases with the Quality assurance specialist.
<b>Ali Abdulla</b>	Quality Assurance Specialist	Internal	M	Reviewing some aspects of the project like the design, security measures and quality requirement to ensure all of them follow some standards.
<b>Hussain Abdullhadi</b>	Risk Officer	Internal	M	Maintaining anything related to the risk that comes with this project along with the mitigation steps
<b>Oliver Smith</b>	Project Analyst	Internal	H	Provides data analysis and managing the project performance plus reports

				to the project manager with anything related to performance.
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**Table 15 Communication Management - Stakeholders Management Strategy and Influence Matrix**

# Risk Management Plan

## Introduction

Risk Management is the process that outlines and analyzes the uncertainties risks that circle any new project. It focuses on identifying the framework that will be used to identify the risks to develop a plan to mitigate those risks or eliminate them.

## Process

The risk management process that was used in this project consists of 4 steps:

- **Risk Management Planning:** the process that outlines the approaches that will be used in the development of this risk management plan. The strategy used in the plan is to manage the risks from the initiate phase until the closing phase.
- **Risk identification:** it is the process that identifies the risks that are linked to the development of the new product
- **Risk analysis with responses:** the process of estimating the damages and effects of the identified risk on the project deliverables based on ranking the risk impact and the risk probability of occurrence. In addition to identifying the mitigation and responses for these risks.
- **Risk monitoring:** monitoring product development periodically to spot and identify any active or rising risks and try to minimize and mitigate the effect of the risk.

## Objectives

- Evaluate the negative risk that comes with the new project
- Developing a mitigation risks analysis
- Ensures minimal occurrence of any negative risks.

## Roles and Responsibilities

The table below represents the RACI table which stands for Responsible, Accountable, Consulted and Informed. The table will showcase the tasks and the level of responsibility of each member when developing the risk management plan.

Responsible	Accountable	Consulted	Informed
Project Manager, Risk Officer	Project Manager	Client, Supervisor	All stakeholders

Table 16 Risk Management RACI

## Approach

The approach will be used in this risk management process:

- Risk breakdown structure (RBS): RBS is a hierarchical risk management technique used to categorize and identifies potential risks that are linked to a project. RBS is broken down into four categories which they are Project Management, Technical, Organizational and External each of these categories represent an area which risk can happen in. This structural approach provides a clear framework for managing and categorising the risk during the project.

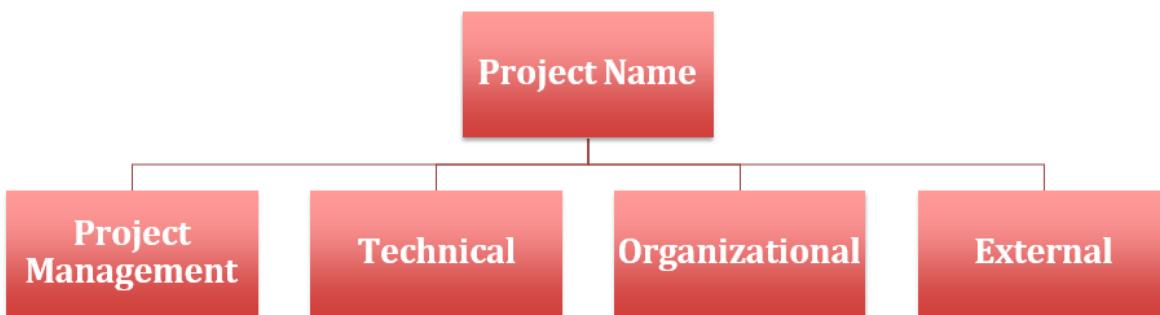


Figure 76 Risk Management Approach

# Report

## Risk Register

ID/ No	Responsible	Risk	Category	Probabilit y (HML)	Impact (HML )	Level P*I	Mitigation	Status
1	Project manager	Delay in procurement process	Project management	M	H	MH	Maintain and build a good relationship with the supplier	Open
2	Project manager	Budget exceeded the planned amount	Project management	M	H	MH	Maintain a contingency reserve	Open
3	Project manager	Miscommunication between team's members	Project management	M	M	MM	Conduct weekly meetings to communicate effectively	Open
4	Risk Officer	Poor risk documentation and monitoring	Project management	M	M	MM	Schedule weekly risk reviews	Open
5	Network Engineer (Core)	MPLS error configuration on core routers	Technical	M	H	MH	Making sure to let someone else to review the configuration	Open
6	Network Engineer (Edge)	No integration between edge devices and legacy devices	Technical	M	M	MM	Check compatibility before deploying	Open
7	Security Specialist	Security breaches and data leaks during implementation	Technical	L	H	LH	Conduct security assessments and pretesting	Open
8	Quality Assurance Specialist	Failure to meet 99.95% uptime	Technical	L	H	LH	Conduct a latency testing before deploying	Open
9	Network Engineer (Core)	Limitations in scalability	Technical	M	M	MM	Making sure to create a scalable design that can have	Open

							multiple scalable areas	
10	Quality Assurance Specialist	Redundancy did not meet standard quality	Technical	L	H	LH	Define redundancy KPIs and perform Quality audits	Open
11	Tester	no extensive testing on the network	Organizational	M	H	MH	Develop a testing plan that runs periodically	Open
12	Project analysis	Inaccurate demand prediction leads to over provisioning	Organizational	M	M	MM	Validate the assumption according to the market data	Open
13	Security Specialist	No compliance with Bahrain telecom laws	External	L	H	LH	Follows and aligns with all TRA laws	Open
14	Risk Officer	Government policy changes	External	L	H	LH	Stay update with the government's policies and updates	Open
15	Project manager	Vendor contract issues	External	M	H	MH	Consider using multiple vendor supplier	Open

Table 17 Risk Management - Risk Register

# Procurement Management Plan

## Introduction

Procurement management is the process that explains how the project will get all the needed goods and services from outside vendors. The procurement plan outlines and describes what needs to be purchased and which supplier will be chosen to purchase these goods from.

## Process

The procurement management process that was used in this project consists of 4 steps:

- **Plan procurement management:** this step is focused on planning and determining the services or goods needed and from where they are needed to be purchased from alongside how to purchase them.
- **Conduct procurement:** this step mainly focuses on evaluating and analyzing all the suppliers' offers and then deciding which supplier is the most suitable for the candidates.
- **Monitor and control procurement:** this process includes maintaining relationships with suppliers and vendors and monitoring the supplier's performance if they deliver on time.
- **Closing the procurement:** this process focuses on closing and finalizing contracts and settle payments of any open items.

## Objectives

- Ensure excellent quality of goods and services
- Determining which supplier is reliable and which is not
- Minimize the risks of goods and services delays

## Roles and Responsibilities

The table below represents the RACI table which stands for Responsible, Accountable, Consulted and Informed. The table will showcase the tasks and the level responsibility of each member when developing the procurement management plan.

Responsible	Accountable	Consulted	Informed
Project Manager	Project Manager	Client, Supervisor	All stakeholders

Table 18 Procurement Management RACI

## Approach

There approaches used in this plan is called Procurement management life cycle (PMLC):

- Determine the budget and prepare all the critical and necessary documents.
- Authorize the procurement process and identify potential vendors.
- reviews quotations from the select vendor to select the most suitable one.
- Issue purchase orders to the chosen vendor for the needed goods and services
- Monitor and follow up on purchase orders
- Receive the delivered goods and services from vendor
- Validates the invoices then prepare the payment
- Record all transactions in the organization financial system

# Integration Management Plan and Closing Plan

## Introduction

Integration management is the process that's ensure all aspects of the project is effectively coordinated and aligned from the initiate phase until the closing phase. In any project, there are many moving pieces in the project. The integration management plan makes sure that all these pieces are connected and aligned toward the same objectives.

## Process

The Integration management and closing process that was used in this project consists of 6 steps:

- Develop the charter
- Develop the plan
- Direct and manage the project execution
- Monitor and control the project work
- Perform change control
- Close the project

## Objective

- To ensures all project components work together smoothly
- To ensure single point of control

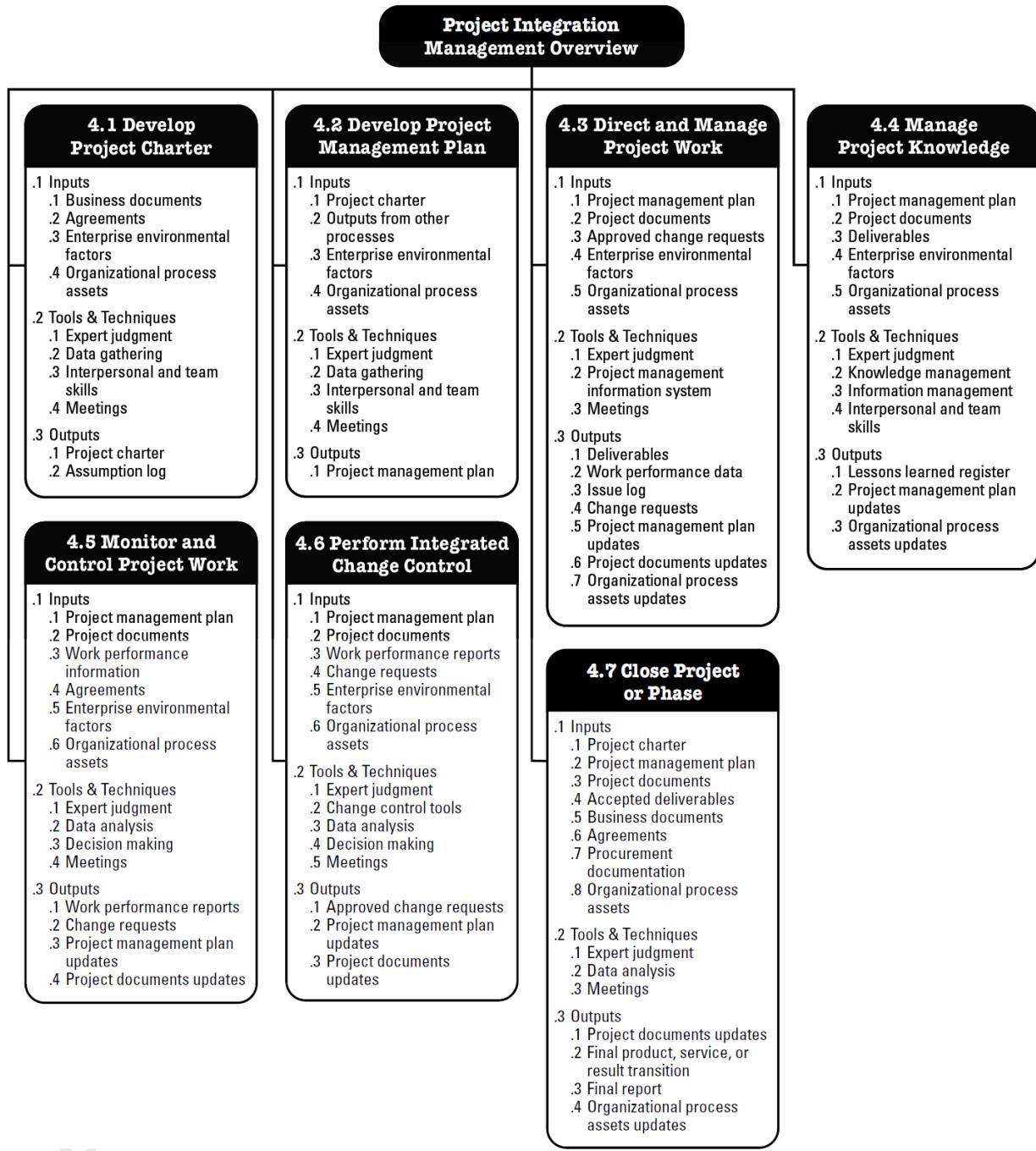
## Roles and Responsibilities

The table below represents the RACI table which stands for Responsible, Accountable, Consulted and Informed. The table will showcase the tasks and the level responsibility of each member when developing the integration management and closing plan.

Responsible	Accountable	Consulted	Informed
Project Manager	Project Manager	Client, Supervisor	All stakeholders

Table 19 Integration Management RACI

## Approach



**Figure 77 Integration Approach**

## Reports

To ensure that the final product meets the client's requirements and expectations, a project closing report has been generated.

No	Criteria	Achieved	Comments
1	Collect all the required document	Yes/No	
2	Validate Functional, non-functional and design requirement achieved	Yes/No	
3	Backup the network configuration	Yes/No	
4	Document lessons learned	Yes/No	
5	Close the risk register matrix	Yes/No	
6	Close quality requirements and test cases matrix	Yes/No	
7	Handover the documentation to the operational team		
8	Obtain all stakeholders signatures and approval	Yes/No	
9	Release all project resources	Yes/No	
10	Save and archive project files and document	Yes/No	
11	Notify stakeholder that the project is complete	Yes/No	
12	Closing meeting	Yes/No	
13	Submit the final product	Yes/No	

Table 20 Closure Checklist

## LESPI

Legal, Ethical, Social, and Professional Issues (LESPI)	
Potential Legal Issues	This project will involve upgrading an ISP core and edge network to implement MPLS VPN technology. Therefore, The project must obey the telecommunication law of the kingdom of Bahrain under the Legislative Decree No. 48 of 2002. in addition to that the project must follow and comply with the national licensing issued by the TRA. Furthermore, all activities should abide by the personal data protection law no 30 of 2018 to ensure the legal and legitimate processing and protection of customer and personal data.
Potential Ethical Issues	The ethical standards of this project will be upheld by guaranteeing fair access, data confidentiality and transparency. Following with the Personal data protection law No. 30 of 2018 alongside with the telecommunication Legislative law No. 48, The project team will protect the information of the customer, avoid unauthorized network monitoring and prevent misuse customer data. Transparent billing and accurate service delivery will follow the Customer protection regulation law of 2017.
Potential Social Issues	The ISP upgrade project will promote inclusive and fair access to the improved network services across Bahrain. According to the telecommunication law 48 of 2002 and Bahrain economic vision 2030 the services will be priced fairly to ensure that it is affordable including

	<p>all areas such as rural and small and medium sized enterprises. Service stability will be maintained according to the TRA Quality of service framework of 2018 to minimize disruption during infrastructure upgrades. in addition to workforce and community impact will be handled in an ethical manner according to the Labor law No. 36 of 2012 in Bahrain.</p>
<b>Potential Professional Issues</b>	<p>The project will maintain high professional standards by enforcing the professional management institution (PMI) code of ethics and professional conduct and following the Project Management Body of Knowledge (PMBOK) 7th edition project management principles. All documentation will achieve full accuracy, transparency and integrity. The team will go under training and induction aligned with the Bahrain labour law No. 36 of 2012. Project staff will follow to the IEEE code of ethics and internal company conduct policies ensuring professionalism and accountability.</p>

**Table 21 LESPI Table**

## Approval Signatures

The signatures of the people below document acceptance and approval of the formal project charter. The sponsor representative must have the authority to commit the client's resources to the project. The project manager is empowered by this charter to proceed with the project as outlined in the charter.

Position/Title	Signature	Date
Project Manager	Hasan Bahzad	2/11/2025
Project Management Office		

Table 22 Approved Table

# Appendices

## Appendix 1: Problem Analysis

### Ishikawa Diagram

Ishikawa diagram was the choice for problem analysis. Ishikawa diagram dives deeper into identifying the cause of a particular problem. According to BGMC the fishbone diagram illustrates the potential causes in a single diagram to make it understandable in simple form. This diagram focuses on what problems need to be solved and how to present them to the stakeholders. The fishbone diagram highlights the problem at the head of the fish, in addition to categorizing the causes into different criteria and the most know criteria are Manpower, Machine, Methods, Materials, Measurements and Mother Nature.

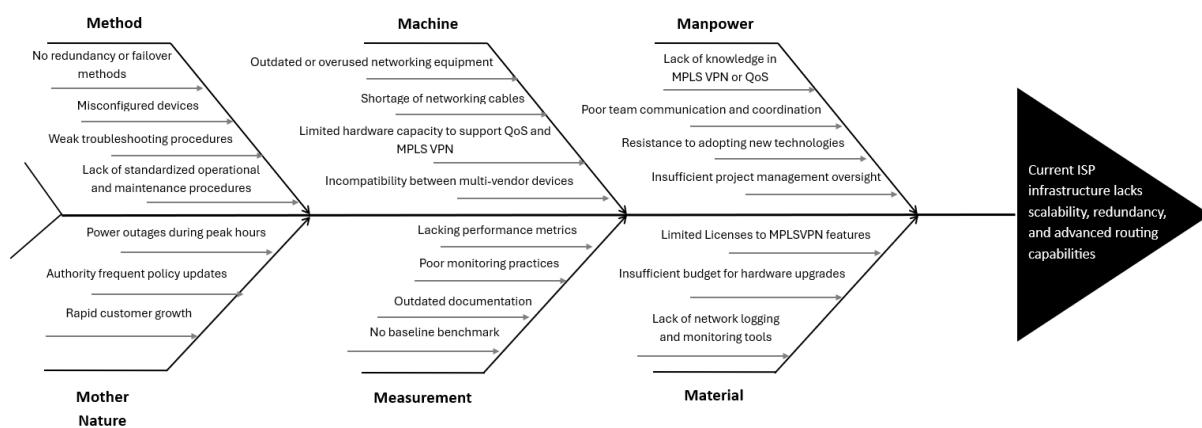


Figure 78 Problem Analysis - Ishikawa Diagram

## Appendix 2: Gathering Requirements

### Interview plan

The interview was conducted with the client. The table below highlights the questions that have been asked in the interview alongside with the client answers to help in determining the functional and non-functional requirements.

<b>PROJECT No. and Title:</b> Kalam Telecom Internet Service Provider	<b>PROJECT MANAGER:</b> Hasan Bahzad
<b>DATE CREATED:</b> 10/02/2025	<b>DATE LAST UPDATED:</b> 10/02/2025
<b>Interview Date and Time:</b> 5/10/2025	<b>Interviewee:</b> Wakil Sarfaraz

Question	Answer	Requirement
What is the key routing and switching protocols should the network support?	The new infrastructure must be label-based packet forwarding technologies and advanced routing protocol.	System must have MPLS, VRF and BGP
What the level of latency is expected from core network	Yes, the network achieves a low latency under specific millisecond.	System must achieve latency at least under 1ms.
How the network will maintain connectivity in case of failure.	The system must support redundancy.	System must ensure redundant links and routes.
are there any legal requirements to consider?	Yes, the regional and local telecom authorities.	Ensure compliance with the regional telecom authority.
How important it is to Kalam Telecom to have network design that can be expanded	Yes, expansion is critical since we frequently open new offices.	Ensure scalability for future proof
What protocols should be implemented to ensure secure connection?	Using secure connection when managing the devices is a must on the system	Implementing SSH for remote access.
Does Kalam telecom prefer standard way of documenting the configuration	Yes, it is preferred to use a standard way for these documents like cisco standards	Following standards procedures when creating documentation
What strategies do want to use to achieve complete logging for the entire system.	We use syslog server monitoring and keep manual logs for incidents	Insure there is logging procedures to better security
What service uptime target should the new infrastructure reach?	Yes, our business depends on stable connectivity. We expect 99.9% uptime.	System must have low latency with 99.9% uptime
What emulation or simulation tool does Kalam Telecom use to design/test the topology environment.	We typically use GNS3 since it emulates real life devices.	Making sure to use emulation tools instead of simulation tools.
How does Kalam Telecom verify that the network topology meets both technical standards goals of the project	By performing end-to-end testing check everything from routing tables, protocol connectivity and so on.	System goes under stress testing for MPLS, System latency and more.

Table 23 Gathering Requirements - Interview Plan

## Prototype

The following figures displays the initial design or prototype for the network topology that outlines the MPLS ISP network. The design included the identification of the PE router and CE router alongside with the MPLS core network and the autonomous system number for each part of the ISP network.

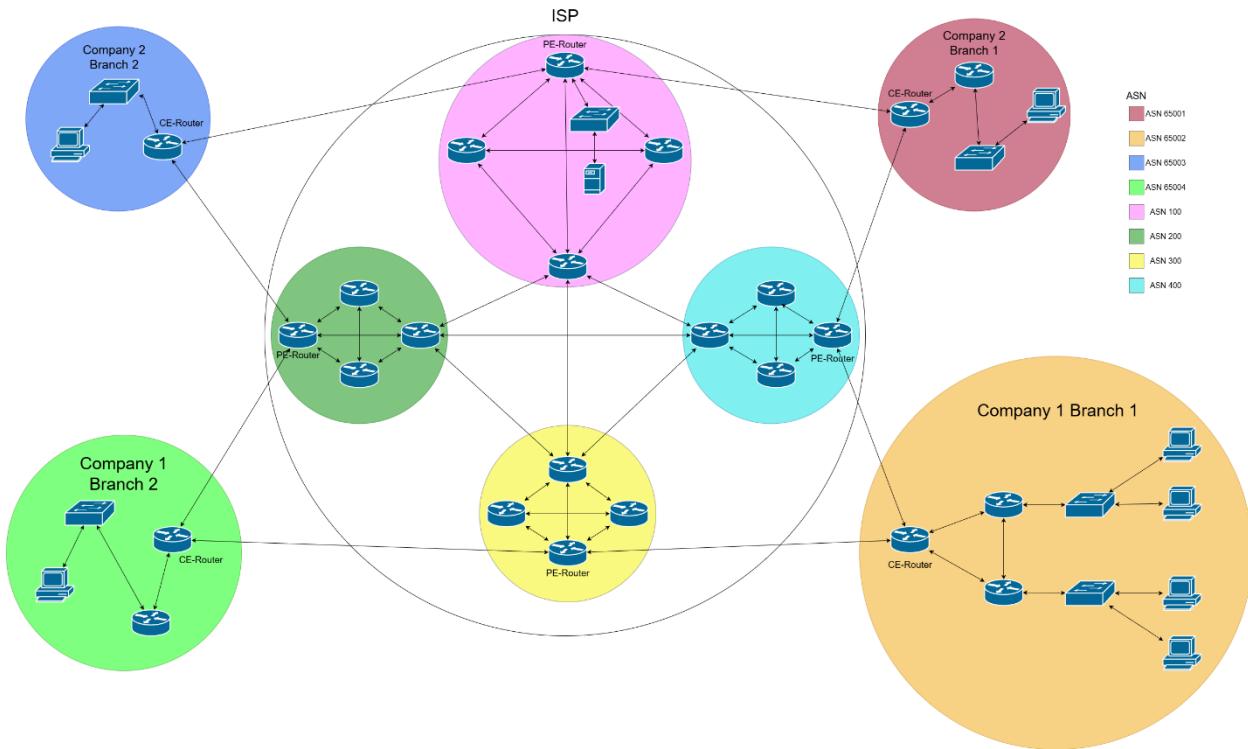


Figure 79 Network Topology Prototype

## Functional Requirements

The functional requirements are the requirements that defines the core features of the product which the product cannot function with them. The below table outlines the functional requirements that needs to be implemented to fulfil the deliverable and scope of the project.

No.	Source Brief/Client /Research	Requirement Description	Data	Process	Communication	Priority H/M/L	Status
Req1	Client	The system must establish connectivity across all core router to ensure efficient label-based packet forwarding.	-	-	✓	H	✓
Req2	Client	The network must utilize different routing protocols for internal routing and external routing.	-	✓	-	H	✓
Req3	Client	Network must establish peering connection between different autonomous systems.	-	-	✓	H	-
Req4	Client	Core router must support quality of services to prioritize real traffic.	-	✓	-	H	✓
Req5	Client	The infrastructure must support secure tunnelling technologies to transmit the packets securely.	-	-	✓	H	✓
Req6	Client	Infrastructure must support redundant links and paths.	✓	-	-	M	✓
Req7	Client	The routers must be capable of dynamic routing and redistribution between internal and external.	-	✓	-	M	✓
Req8	Client	The system must provide and support route summarization.	-		-	M	✓
Req9	Client	The network must be able to reroute traffic in case of link failure.	-	✓	-	H	✓
Req10	Client	The core network must support IP addressing with hierarchical scheme.	✓	-	-	H	✓
Req11	Client	The routers must allow SSH for administrative tasks.	-	-	✓	M	✓

<b>Req12</b>	Client	The system must provide network logging.	✓	-	-	M	✓
<b>Req13</b>	Client	The network must support multiple customers VPNs using to ensure secure and isolated communication between the customers.	✓	-	-	M	✓
<b>Req14</b>	Client	The Label-based packet forwarding must allow traffic engineering for optimal utilization.	-	✓	-	M	-
<b>Req15</b>	Client	The network must support multiple VLANs to separate departments in the infrastructure.	✓	-	-	L	✓

**Table 24 Gathering Requirements - Functional Requirements**

## Non-functional requirements

The non-functional requirements are the requirements that define the quality, efficiency and performance of the product. The below table outlines the non-functional requirements that needs to be implemented to fulfil the deliverable and scope of the project.

No.	Source Brief/Client /Research	Requirement Description	Performance Information Economics Control/security Efficiency Services Priority H/M/L Status							
			Performance	Information	Economics	Control/security	Efficiency	Services	Priority	H/M/L
Req1	Client	Infrastructure must achieve 99.9% uptime.	✓	-	-	-	-	-	H	-
Req2	Client	System must achieve low latency on all times.	✓	-	-	-	-	-	H	-
Req3	Client	The system should support scalability for adding at least two more additional routers	-	-	-	-	-	✓	M	-
Req4	Client	Configuration changes must not interrupt existing the network.	-	-	-	-	✓	-	H	-
Req5	Client	The system must maintain standards configuration documentation.	-	✓	-	-	-	-	H	-
Req6	Client	Staff must have proper training and knowledge.	-	-	-	-	-	✓	M	-
Req7	Client	Security mechanisms must protect the network against unauthorized access.	-	-	-	✓	-	-	H	-
Req8	Client	QoS policies must guarantee a minimum of 1 Mbps for high-priority traffic.	✓	-	-	-	-	-	M	-
Req9	Client	The system must recover from link or failure within smaller amount of time.	✓	-	-	-	-	-	H	-
Req10	Client	Network documentation must be clear and complete.	-	✓	-	-	-	-	M	-
Req11	Client	The project must remain under budget.	-	-	✓	-	-	-	M	-
Req12	Client	All routers must load configurations within 2 minutes.	-	-	-	-	✓	-	L	-
Req13	Client	System must maintain and archives reports, logs and performance metrics for at least 12 months	-	✓	-	-	-	-	M	-
Req14	Client	Comply with the regional laws and organization policies.	-	-	-	✓	-	-	H	-
Req15	Client	All network elements must comply with industrial networking standards	-	-	-	✓	-	-	L	-

Table 25 Gathering Requirements - Non-Functional Requirements

## Design requirements

The design requirements outlined below will define the look and feel of the product. The design requirements have been determined from the client interview and the project brief.

No.	Source Brief/Client /Research	Requirement Description	Performance	Information	Economics	Control/security	Efficiency	Services	Priority H/M/L	Status
Req1	Client	BGP will be used between ISP autonomous system for external routing protocol	✓	-	-	-	-	-	H	-
Req2	Client	OSPF protocol will be used as the internal routing protocol within each ISP autonomous system	✓	-	-	-	-	-	H	-
Req3	Client	MPLS will be used for label-based packet forwarding in the core and edge routers	✓	-	-	-	-	-	H	-
Req4	Client	QoS will be configured on the MPLS.	✓	-	-	-	-	-	M	-
Req5	Client	BGP protocol will connect the customer to ISPs networks through PE and CE routers.	-	-	-	-	-	✓	H	-
Req6	Client	The network topology will use the three layers design: core, distribution and access	-	-	-	-	✓	-	M	-
Req7	Client	Each site must include at least one PE router that support MPLS	-	-	-	-	-	✓	H	-
Req8	Client	PPP will be used as the connection type between the customer and ISP	-	-	-	-	-	✓	M	-
Req9	Client	NAT will be applied to convert the IP address of the customer	-	-	-	✓	-	-	M	-
Req10	Client	IP address allocation must follow CIDR notation	-	✓	-	-	-	-	H	-
Req11	Client	Radius protocol will be used as the authentication, Authorization and accounting	-	-	-	✓	-	-	M	-
Req12	Client	Deploying a dedicated server for Radius and Syslog	-	-	-	✓	-	-	M	-
Req13	Client	BGP Autonomous System Numbers must be logically assigned and documented properly	-	✓	-	-	-	-	H	-
Req14	Client	MPLS label distribution must use the LDP protocol	-	-	-	-	✓	-	H	-
Req15	Client	Network configuration must include comments for maintenance and troubleshooting	-	✓	-	-	-	-	L	-

Table 26 Gathering Requirements - Design Requirements

## Appendix 3: Decision Analysis

### COTS Matrix

The following table is called the Commercial of the shelf (COTS) Matrix which includes 2 alternative products that accomplish the scope objectives of this product.

Characteristics	MPLS VPN	SD-WAN	EVPN Service
<b>Benefits</b>	This will allow our network to deliver High reliability and performance services including Quality of service and predictable latency using the dedicated private WAN connection.	This will allow our network to offer a centralized software defined application for WAN connection that will allow efficient management of the customer network from a single place.	The EVPN will allow our network to Uses both layer 2 ethernet and layer 3 VPN features which will allow us to deliver reliable and efficient services with built in mac address learning and redundancy for enterprise customers.
<b>Hardware</b>	Requires Provider edge (PE) routers and Customer edge (CE) router that are capable of MPLS and VRF for traffic engineers, high performance router is needed.	Uses devices that support SD-WAN edge, controller and gateways. Devices can be vendor specific.	Uses devices that support the BGP-EVPN and VXLAN encapsulation as an option along with an Edge router that can handle MAC/IP route advertisement.
<b>Software</b>	Relies on MPLS protocols (either label distribution protocol and RSVP- TE) and MP-BGP alongside MPLS routing OS features.	SD-WAN software centralized the management of the policies and tracking the performance with edge tools that picks the best route automatically.	Relies on the BGP-EVPN control plane protocol as for both layer 2 and layer 3 forwarding.
<b>Cost</b>	High cost for both deployment and operational and longtime deployment.	Low cost when talking about transport links but high cost for software licensing and hardware deployment.	Medium cost for both deployment and operational since it uses the existing networks, but the hardware and licensing have high cost.

<b>Security</b>	Offers a private dedicated WAN link with traffic separation without native encryption support for customers.	incorporate IPsec-based encryption when creating tunnels in addition to firewalls and segmentation methods.	EVPN provides network with strong isolation and security for customers since it can use one of the MACsec or IPsec overlays for added security.
<b>Method of Data Processing</b>	Uses label switching between the provider edge and customer edge to ensure fast forwarding and to separate traffic while ensuring real-time forwarding.	Data processed through encrypted overlay tunnels using real-time link performance.	EVPN network uses ethernet encapsulation alongside the BGP-EVPN for advertisement. Data can traverse already existing networks.
<b>Operational</b>	MPLS VPN network has proven to be stable and reliable, but it requires continuous management for setting up and managing the network while using dedicated link infrastructure. MPLS VPN will allow us to maintain full control over the quality of services, services level performance and traffic engineering.	SD-WAN simplifies operations by using automatic configuration and by choosing the best path available for that specific application. SD-WAN introduces heavy dependencies on the software controllers which will lead to continuous controlling.	EVPN service will be managed through the BGP control plane which will allow us to make it simpler when performing customer hand-off. EVPN still requires continuous coordination between layer 2 and layer 3 services, making the operations more complex when working in a multi-site environment.

Table 27 Decision Analysis - COTS Matrix

## COTS Weighted Matrix

The following table is the COTS weighted matrix; this table evaluates the 2-alternative solution and compares them in various feasibilities to accumulate a final score for all alternatives.

Feasibility Criteria	Wt.	MPLS VPN	SD-WAN	EVPN Services
<b>Operational Feasibility</b>				
An assessment of how well the solution meets the identified system requirements to solve the problems and take advantage of the opportunities envisioned for the system.	20%	Provide stable, high reliability with high quality of service performance and efficient traffic engineer and predictable latency. In addition, it's integrated with OSPF and BGP.	SD-WAN manages and controls route traffic, which helps improving performance for customers. SD-WAN heavily relies on internet quality. Making it less predictable than MPLS.	Builds on the foundation of BGP protocol to provide more flexibility for layer 2 and layer 3 which allowing easier and more flexibility in terms of expansion.
Score:		95%	85%	90%
<b>Cultural/Political Feasibility</b>				
An assessment of how well the solution will be accepted in a given organizational climate.	15%	MPLS is a well-used service in internet service providers also aligned with the ISP culture and tools.	SD-WAN is considered as a new technology and brings a shift to the cultural towards software-defined networking. Some staff may need training to adapt to the new technology.	Easy to adopt for teams that already using full BGP network also, it has minimal changes since it uses an existing network transport links.
Score:		90%	80%	85%
<b>Technical Feasibility</b>				
An assessment of the practicality of the solution and the availability of technical resources and expertise to	15%	MPLS support multiple advanced routing protocol, Quality of service, VRF and Traffic engineer. The ISP already has compatible routers and experienced staff.	SD-WAN offers high flexibility and modern control and management, and it is complex to integrate with old systems.	technically more advanced than MPLS VPN since it is a control plane technology that runs over an existing network rather than it's a separate network. EVPN is complex to

<b>implement and maintain it.</b>				<b>implement and integrate with old system.</b>
<b>Score:</b>		100%	90%	80%
<b>Economic Feasibility</b>		MPLS is expensive when setting it initially but overtime it can be cost effective since the ISP can change the MPLS service to ensure long term revenue and proven ROI for ISPs	SD-WAN have lower cost since it uses multiple cheaper connection but in the other hand it requires a software licenses and vendor support that increase total expenses.	The implementation cost of EVPN depends on the existing network. If EVPN was deployed over Fully functional existing BGP network cost will be low.
<b>An assessment of the cost-effectiveness of a project or solution.</b>	<b>30%</b>			
<b>Score:</b>		85%	85%	90%
<b>Schedule Feasibility</b>		MPLS take longer to develop and implement initially it takes 1 to 3 months because it requires careful configuration.	SD-WAN can be implemented faster because its software defines nature, but tuning controller and policy may take a while.	EVPN is faster to build because it will be built on top of the existing infrastructure network.
<b>An assessment of how long the solution will take to design and implement.</b>	<b>10%</b>			
<b>Score:</b>		85%	80%	90%
<b>Legal Feasibility</b>		MPLS complies with international and regional laws. It provides service level agreements and supports laws that support customer protection data.	SD-WAN solutions meet security standards but also heavily depends on vendor architecture.	Fully compliant with the existing BGP network, providing strong isolation and data protection.
<b>An assessment of how well the solution can be implemented within existing legal and contractual obligations.</b>	<b>10%</b>			
<b>Score:</b>		95%	85%	90%
<b>Total Score:</b>	<b>100%</b>	91%	85%	88%

Table 28 Decision Analysis - COTS Weighted Matrix

## Decision Statement

Based on the results of both tables, the COTS matrix and COTS weighted matrix, MPLS VPN achieved the highest overall score and met the technical and operational requirements of Kalam Telecom project. Therefore, the MPLS VPN will be selected as the most suitable solution to implement this service within Kalam Telecom's network to achieve reliability, performance and scalability.

## Resource Sheet – Entry View

The figure below lists all the resources used in the project. It shows the resources type whether they are work resources cost resources and material resources, and how much they cost per hour and which of these resources has one time cost. It is a very helpful tool to the project manager to keep a detailed record of all project resources, all in one place

	①	Resource Name	Name	Type	Material	Initials	Group	Max.	Std. Rate	Ovt.	Cost/Unit	Accrue	Base
1		Project Manager	Hasan Bahzad	Work		P		100%	\$65.00/hr	\$0.00/hr	\$0.00	Prorated	Standard
2		Network Engineer (Core)	Hasan Ahmadi	Work		N		100%	\$60.00/hr	\$0.00/hr	\$0.00	Prorated	Standard
3		Network Engineer (Edge)	Salman Ali	Work		N		100%	\$60.00/hr	\$0.00/hr	\$0.00	Prorated	Standard
4		Security Specialist	Raju Kumar	Work		S		100%	\$50.00/hr	\$0.00/hr	\$0.00	Prorated	Standard
5		Tester	Mohammed Zuhair	Work		T		100%	\$50.00/hr	\$0.00/hr	\$0.00	Prorated	Standard
6		Quality Assurance Specialist	Ali Abdulla	Work		Q		100%	\$50.00/hr	\$0.00/hr	\$0.00	Prorated	Standard
7		Risk Officer	Hussain Abdulhadi	Work		R		100%	\$50.00/hr	\$0.00/hr	\$0.00	Prorated	Standard
8		Project Analyst	Oliver Smith	Work		P		100%	\$50.00/hr	\$0.00/hr	\$0.00	Prorated	Standard
9		Cisco Edge Router		Material	unit	C				\$120,000.00		\$0.00	Prorated
10		Cisco Core Router		Material	unit	C				\$60,000.00		\$0.00	Prorated
11		Fiber Optic cables and SFPs		Material		F				\$350,000.00		\$0.00	Prorated

Figure 80 Decision Analysis - Resource Sheet Entry View

## Resource Sheet – Cost View

The below figure outlines the calculated cost for each resource used during the project development. It provides an insight into the full sum of all resource costs. In addition, this figure can assist and help to calculate the total budget of the project.

	Resource Name	Person Name	Cost	Baseline	Variance	Actual Cost	Remaining	A
1	Project Manager	Hasan Bahzad	\$10,660.00	\$10,660.00	\$0.00	\$6,240.00	\$4,420.00	
2	Network Engineer (Core)	Hasan Ahmadi	\$5,340.00	\$5,340.00	\$0.00	\$0.00	\$5,340.00	
3	Network Engineer (Edge)	Salman Ali	\$6,510.00	\$6,510.00	\$0.00	\$0.00	\$6,510.00	
4	Security Specialist	Raju Kumar	\$1,600.00	\$1,600.00	\$0.00	\$0.00	\$1,600.00	
5	Tester	Mohammed Zuhair	\$1,950.00	\$1,950.00	\$0.00	\$0.00	\$1,950.00	
6	Quality Assurance Specialist	Ali Abdulla	\$2,575.00	\$2,575.00	\$0.00	\$0.00	\$2,575.00	
7	Risk Officer	Hussain Abdulhadi	\$550.00	\$550.00	\$0.00	\$550.00	\$0.00	
8	Project Analyst	Oliver Smith	\$3,150.00	\$3,150.00	\$0.00	\$3,150.00	\$0.00	
9	Cisco Edge Router		\$720,000.00	\$720,000.00	\$0.00	\$0.00	\$720,000.00	
10	Cisco Core Router		\$600,000.00	\$600,000.00	\$0.00	\$0.00	\$600,000.00	
11	Fiber Optic cables and SFPs		\$350,000.00	\$350,000.00	\$0.00	\$0.00	\$350,000.00	

Figure 81 Decision Analysis - Resource Sheet Cost View

## Cost Benefit Analysis

Cost Benefit Analysis is an evaluation tool that helps the project manager to identify and compare the cost of the project as well as the benefits associated with the project. The CBA can help and support and project manager in determining the budget estimation cost in addition to that it will help to outline the overall value of the project.

Cost-Benefit Analysis								
	Cash Flow Description	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
<b>Costs</b>								
Development Costs : Estimated in MS Project Resource Sheet		-32335.00						
Hardware Costs - Estimated in MS Project Resource Sheet		-1670000.00						
Software Licenses		-40000.00						
Operations and Maintenance Costs		-30000.00	-30000.00	-30000.00	-30000.00	-30000.00	-30000.00	-30000.00
Power & Cooling		-25000.00	-25000.00	-25000.00	-25000.00	-25000.00	-25000.00	-25000.00
Transit Fees between ISPs		-90000.00	-90000.00	-90000.00	-90000.00	-90000.00	-90000.00	-90000.00
System Upgrades		-11000.00	-11000.00	-11000.00	-11000.00	-11000.00	-11000.00	-11000.00
<b>Total Costs</b>		<b>-1742335.00</b>	<b>-156000.00</b>	<b>-156000.00</b>	<b>-156000.00</b>	<b>-156000.00</b>	<b>-156000.00</b>	<b>-156000.00</b>
<b>Benefits</b>								
Saving in leased fixed network line		150000.00	150000.00	150000.00	150000.00	150000.00	150000.00	150000.00
Reducing downtime		80710.00	80710.00	80710.00	80710.00	80710.00	80710.00	80710.00
MPLS VPN subscription revenue		500000.00	500000.00	500000.00	500000.00	500000.00	500000.00	500000.00
QoS subscription revenue		480000.00	480000.00	480000.00	480000.00	480000.00	480000.00	480000.00
Efficiency improvement		35000.00	35000.00	35000.00	35000.00	35000.00	35000.00	35000.00
Savings in training		15000.00	15000.00	15000.00	15000.00	15000.00	15000.00	15000.00
Improving security		30000.00	30000.00	30000.00	30000.00	30000.00	30000.00	30000.00
<b>Total Benefits</b>		<b>1290710.00</b>	<b>1290710.00</b>	<b>1290710.00</b>	<b>1290710.00</b>	<b>1290710.00</b>	<b>1290710.00</b>	<b>1290710.00</b>
Profit before tax		-1742335.00	1134710.00	1134710.00	1134710.00	1134710.00	1134710.00	1134710.00
Profit After Tax (10%)		-1742335.00	1021239.00	1021239.00	1021239.00	1021239.00	1021239.00	1021239.00
Discount factors for 12%		1.0000	0.8929	0.7972	0.7118	0.6355	0.5674	0.5066
Profit Present Values		-1742335.00	911820.54	814125.48	726897.75	649015.85	579478.43	517391.46
<b>Accumulated Profit</b>		<b>-1742335.00</b>	<b>-830514.46</b>	<b>-16388.99</b>	<b>710508.76</b>	<b>1359524.61</b>	<b>1939003.04</b>	<b>2456394.50</b>
Internal Rate of Return		<b>54.2640627%</b>						
ROI								

Figure 82 Decision Analysis – Cost Benefit Analysis

## Payback Period

Payback Period is considered to be a financial metric which is used to determine how long a project will take to recover its initial cost. Payback period metric also outlines and measures the project liquidity and risk by calculating the required time to breakeven point. When the project has shorter payback period it suggests a quicker return on investment and lower financial risk.

### Calculation of the Payback Period

We see that the accumulated NPV changes sign between years 2 and 3, which means that somewhere in that interval NPV function must be equal to 0. Recall that NPV represents the profit, and when the profit is 0, we have got the break-even. Determining the point of intersection, we actually determine the payback period. Let's see how to do that.

Firstly, we determine the absolute value of NPV change in the interval [2, 3]. At the end of year 2, the value of NPV is -16388.99 and at the end of year 3 it is 710508.76. The absolute value is

$$|-16388.99| + 710508.76 = 726897.75 \quad <\dots \text{ change per year}$$

Secondly, we devide the obtained NPV value by 12 to see the change per month in that particular interval [2, 3].

$$726897.75 / 12 = 60574.81 \quad <\dots \text{ change per month}$$

Thirdly, we devide 16388.99 by 60574.81 to see after how many months will that value become equal to 0.

$$16388.99 / 60574.81 = 0.27$$

Therefore, the payback period is 3 years and 0.27 months. See the chart below.

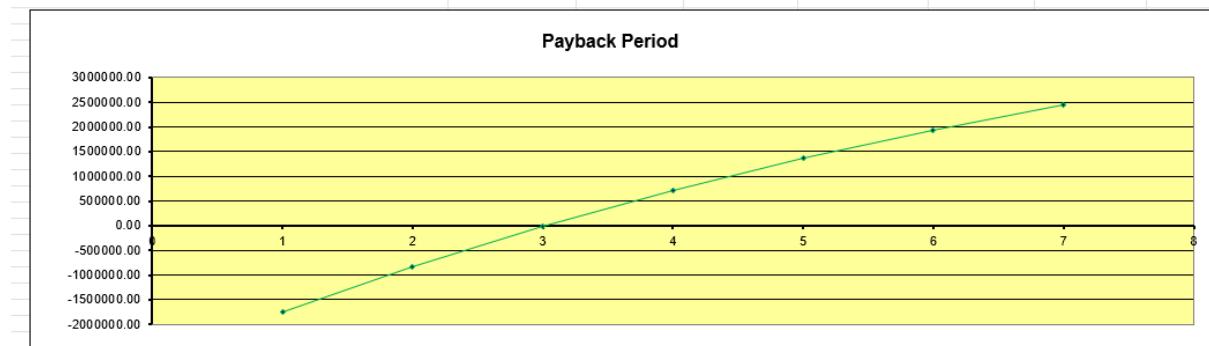


Figure 83 Decision Analysis – Payback Period Calculation

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