

Zero-Touch Energy Audit

- Finding a Automated Solution for Energy Audit

Client Introduction

NPCL is a joint venture between RP-Sanjiv Goenka Group, a leading business house in India and Greater Noida Industrial Development Authority, an autonomous body of U.P. Government responsible for town planning and infrastructure development.



Operational Area: 335 sq.km



Customer Base: 85 K

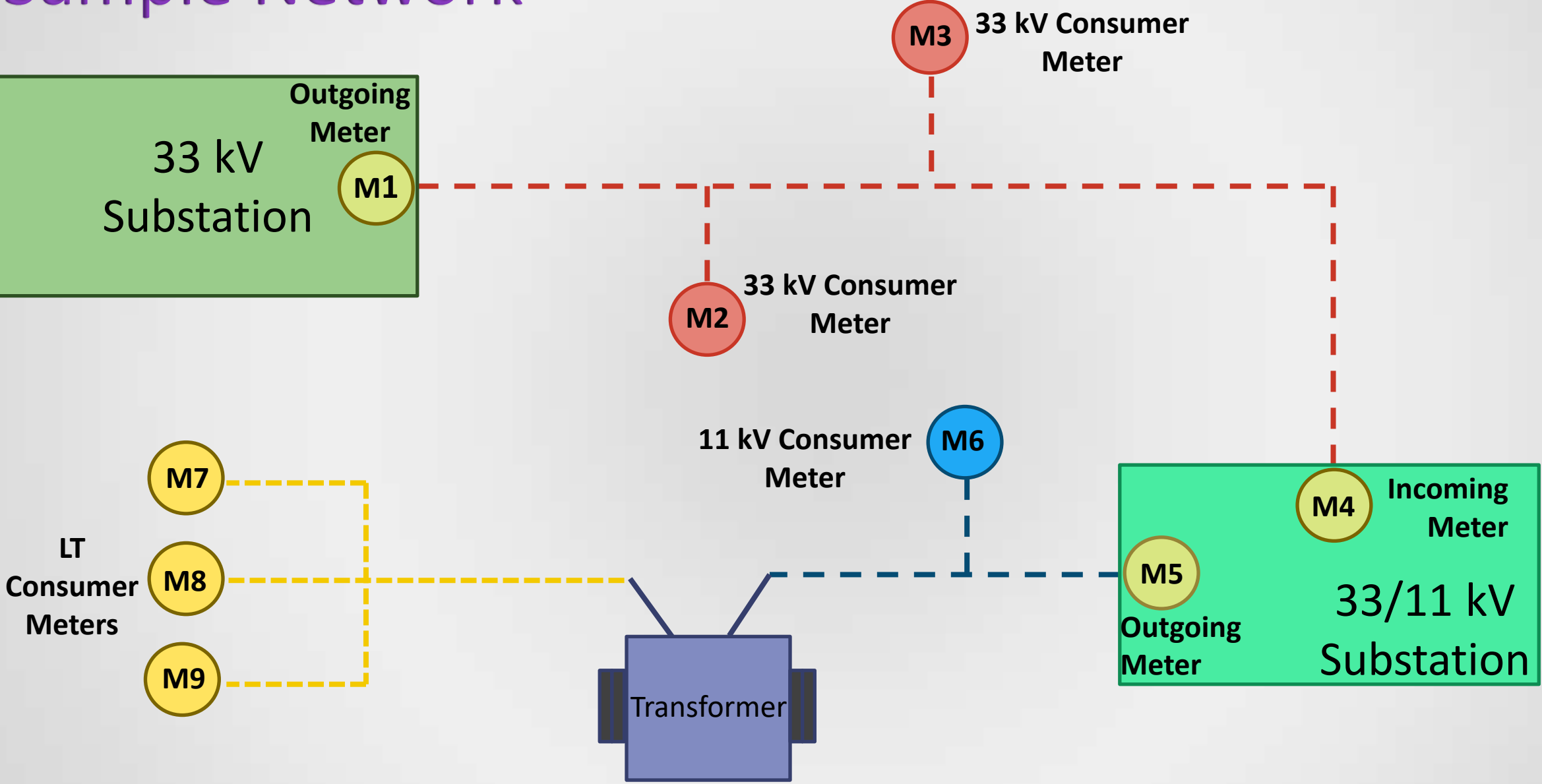


Peak Load: 180 MVA

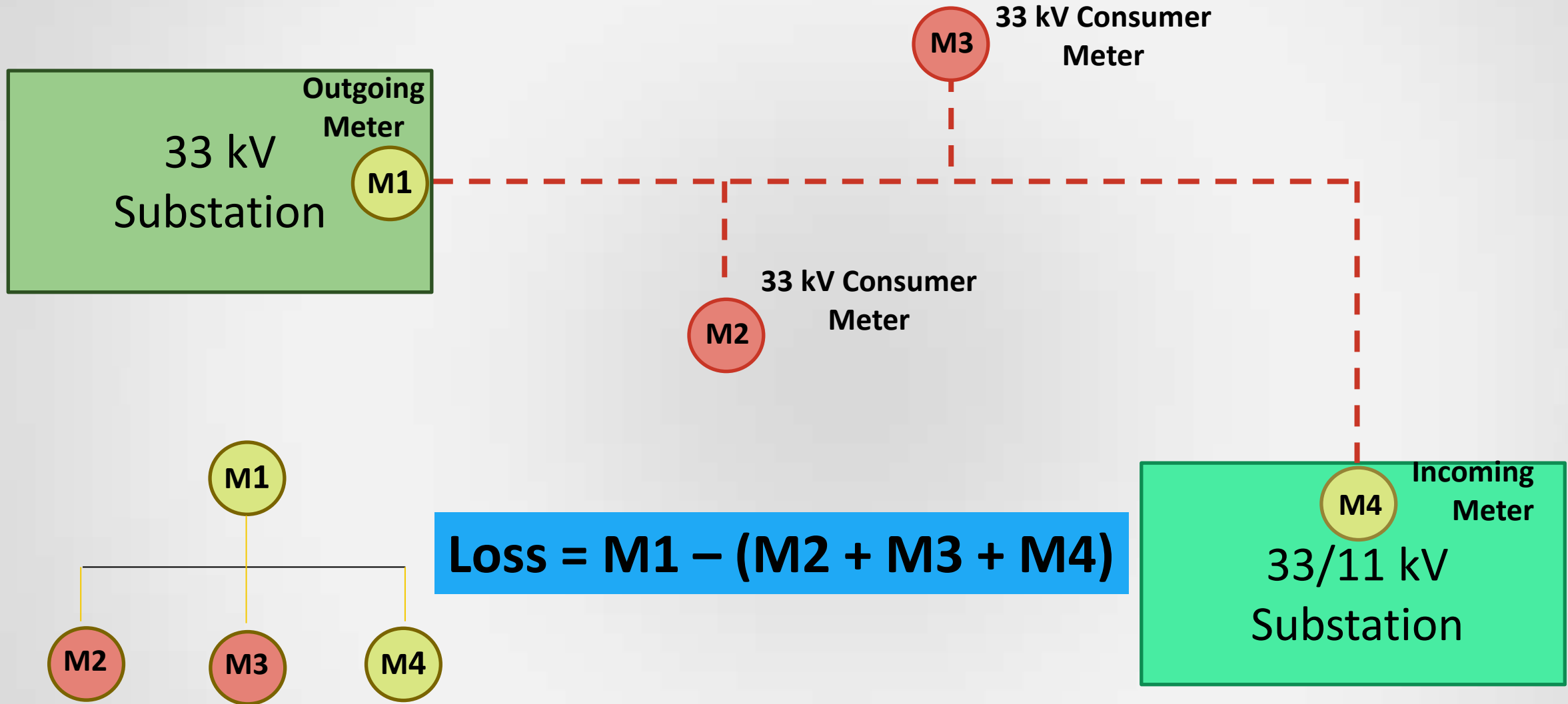


**10x Increase in
Customer Base & Peak
Load**

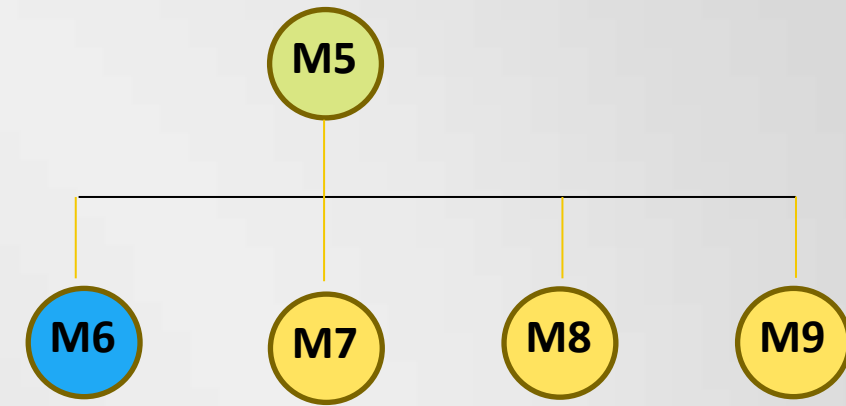
Sample Network



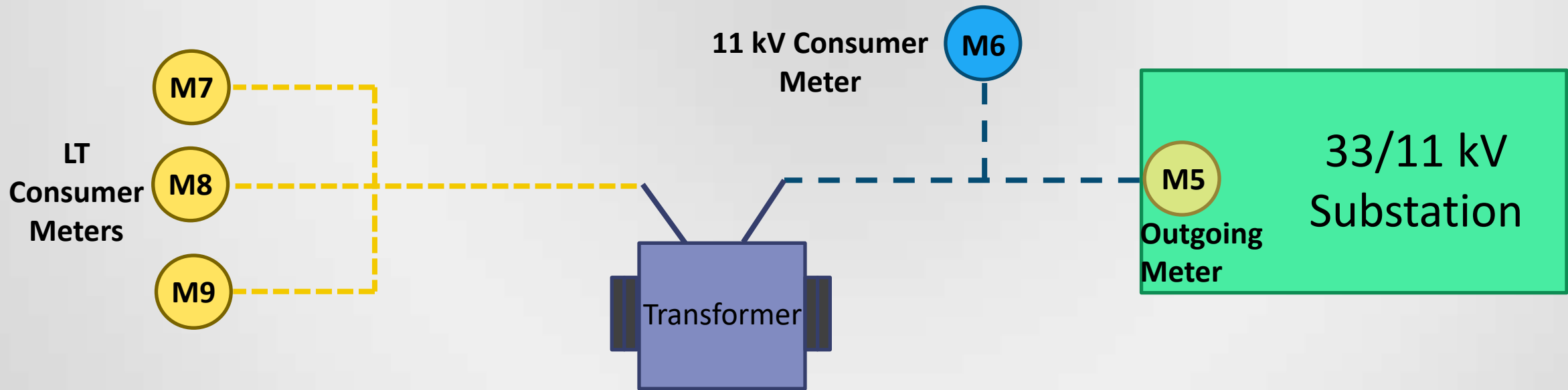
Loss Calculation (HT Network)



Loss Calculation (LT Network)

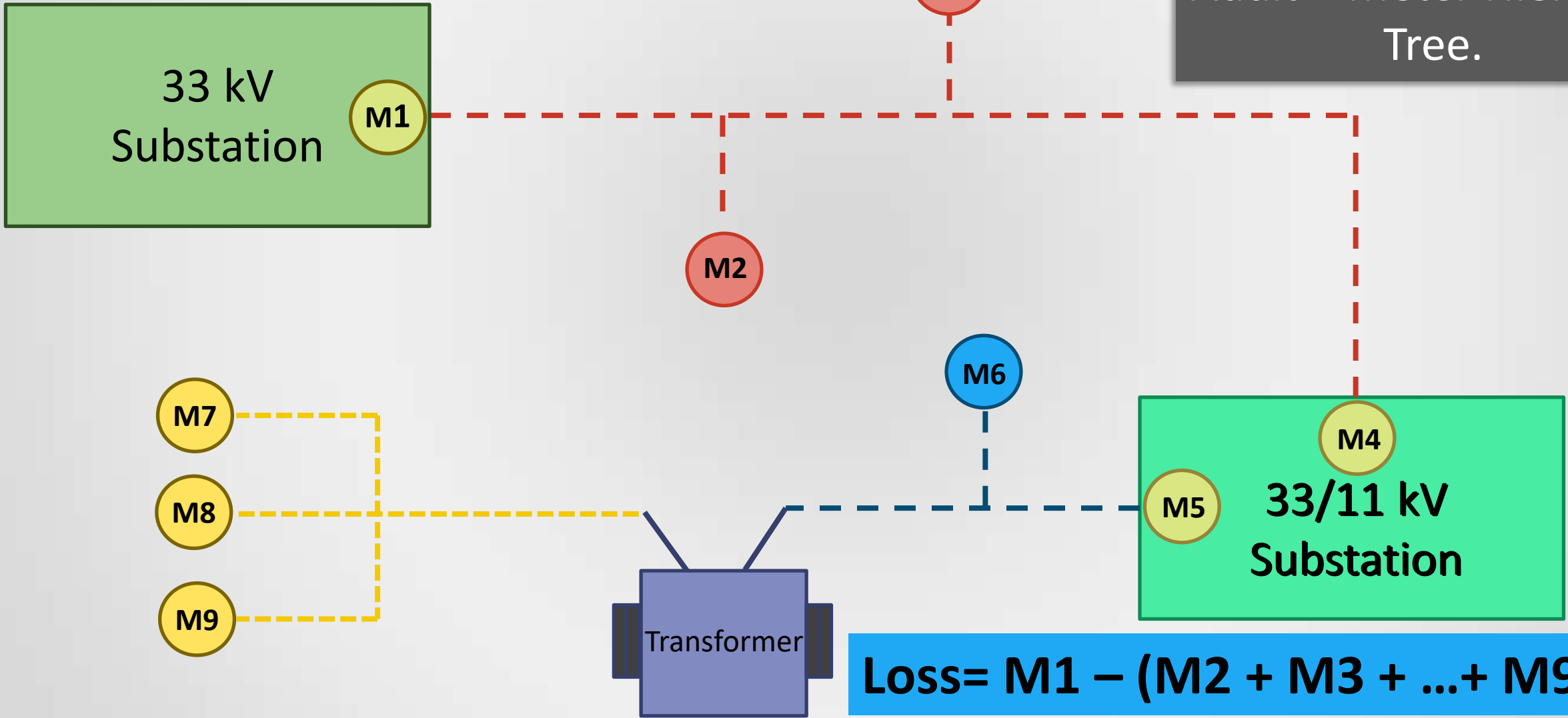


$$\text{Loss} = M5 - (M6 + M7 + M8 + M9)$$



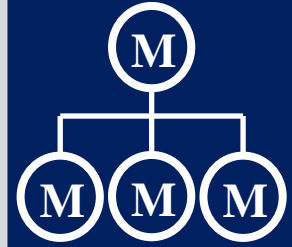
Loss Calculation (Entire Network)

Pre-Requisite of Energy Audit = Meter Hierarchy Tree.



Loss = M1 - (M2 + M3 + ... + M9)

Challenges



Establish
Hierarchy

Accurately capture all the Metering Points present in the network and place them in a logical hierarchical tree.



Micro-Manage
Audit

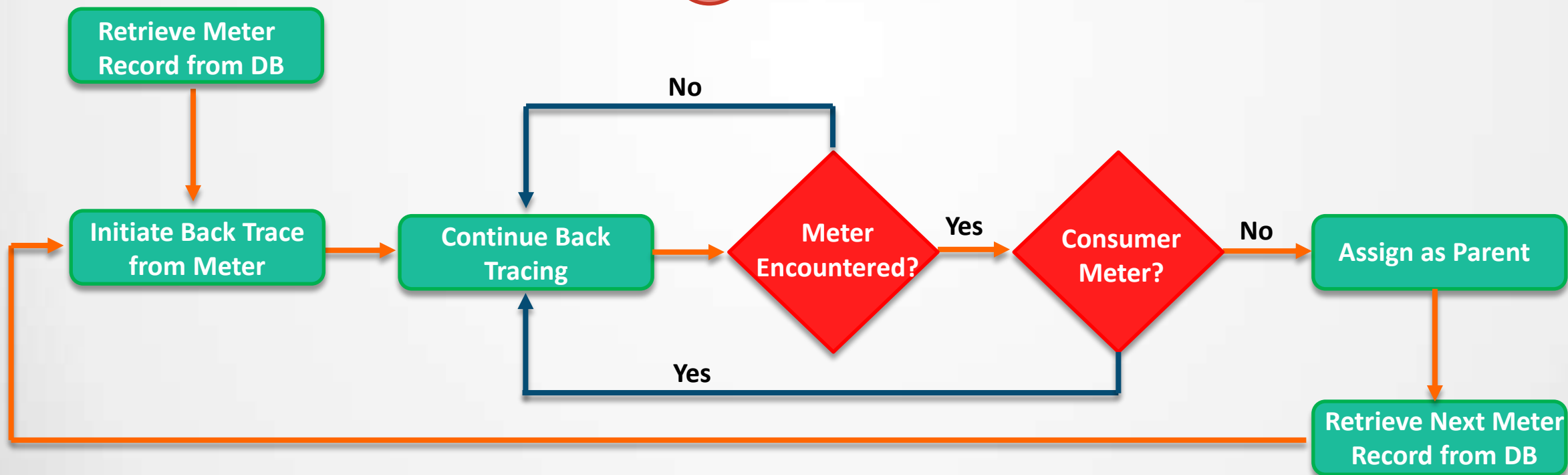
Micro-Manage Audit by introducing more Meter Levels in the hierarchical tree.

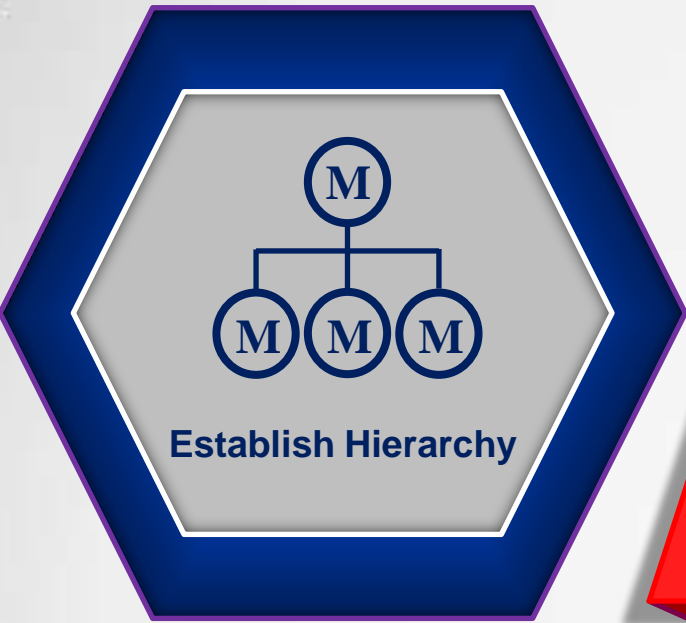


Capture
Network
Updates

Capture and update the hierarchical tree in case of any Network changes such as Network Extension, Switching, etc.

Algorithm Used





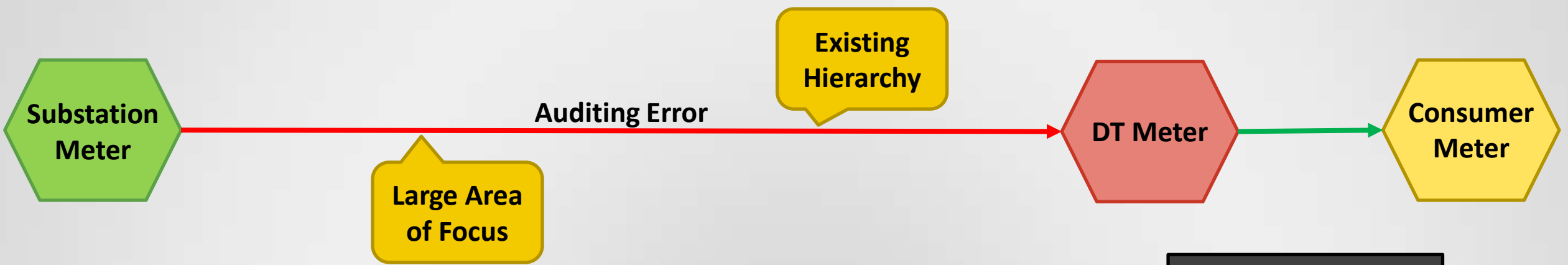
Problem Statement:

Accurately capture all the Metering Points present in the network and place them in a logical hierarchical tree.

Solution:

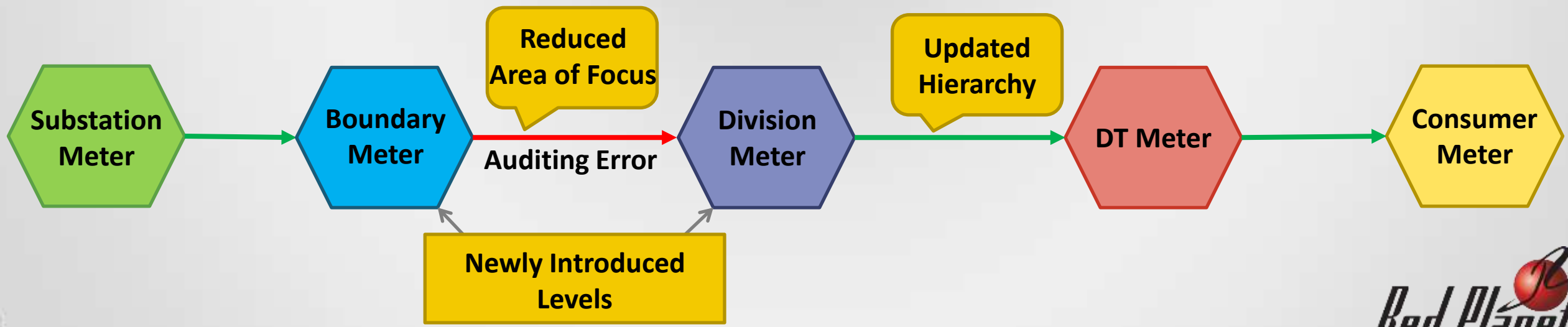
For each Meter present in the DB, use back-tracing to find its Parent Meter (Non-Consumer).

Micro-Managing Audit

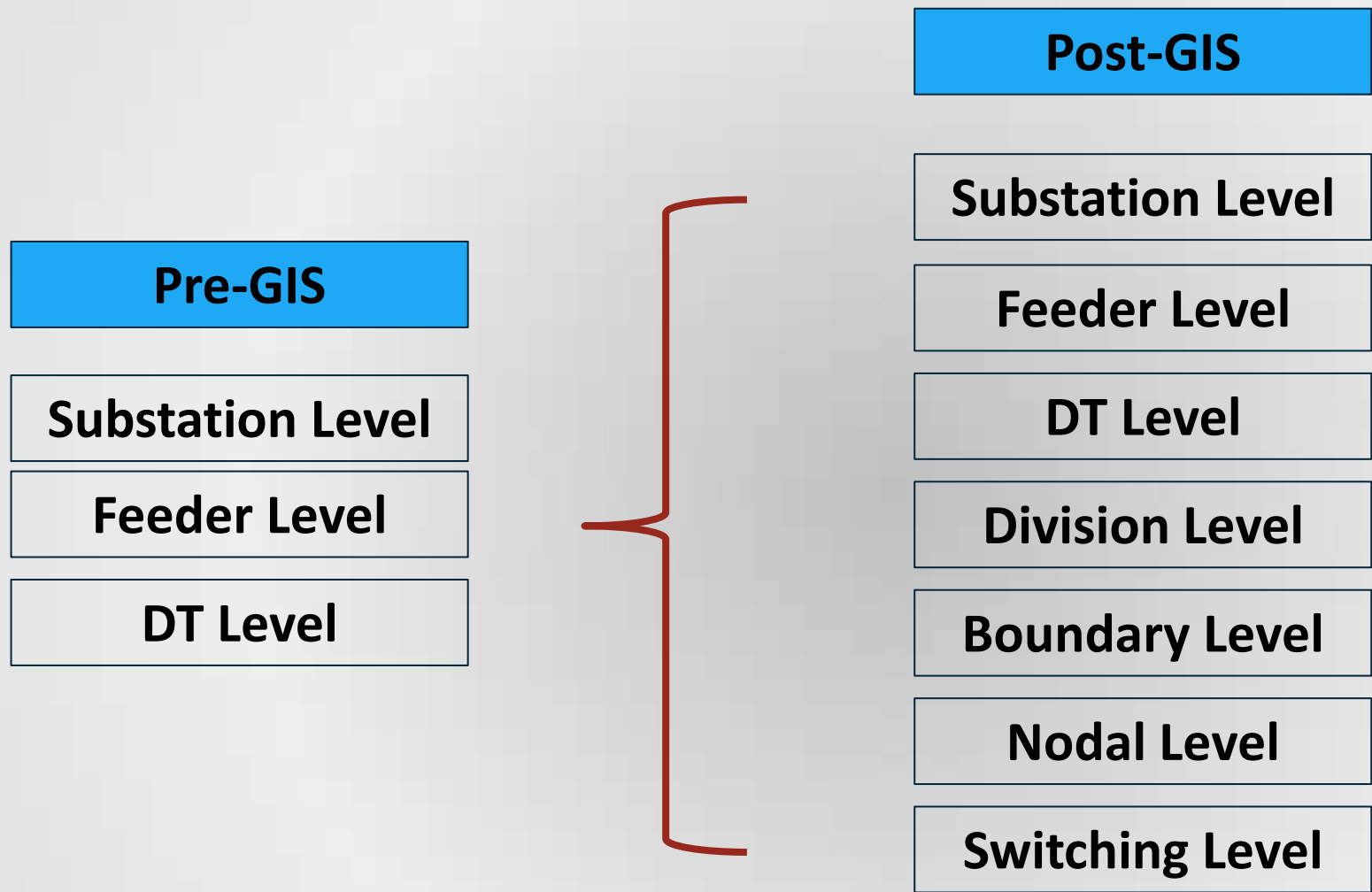


Legends:

- Segment with excessive Energy Loss
- Normal Segment



Current Hierarchical Nodes.





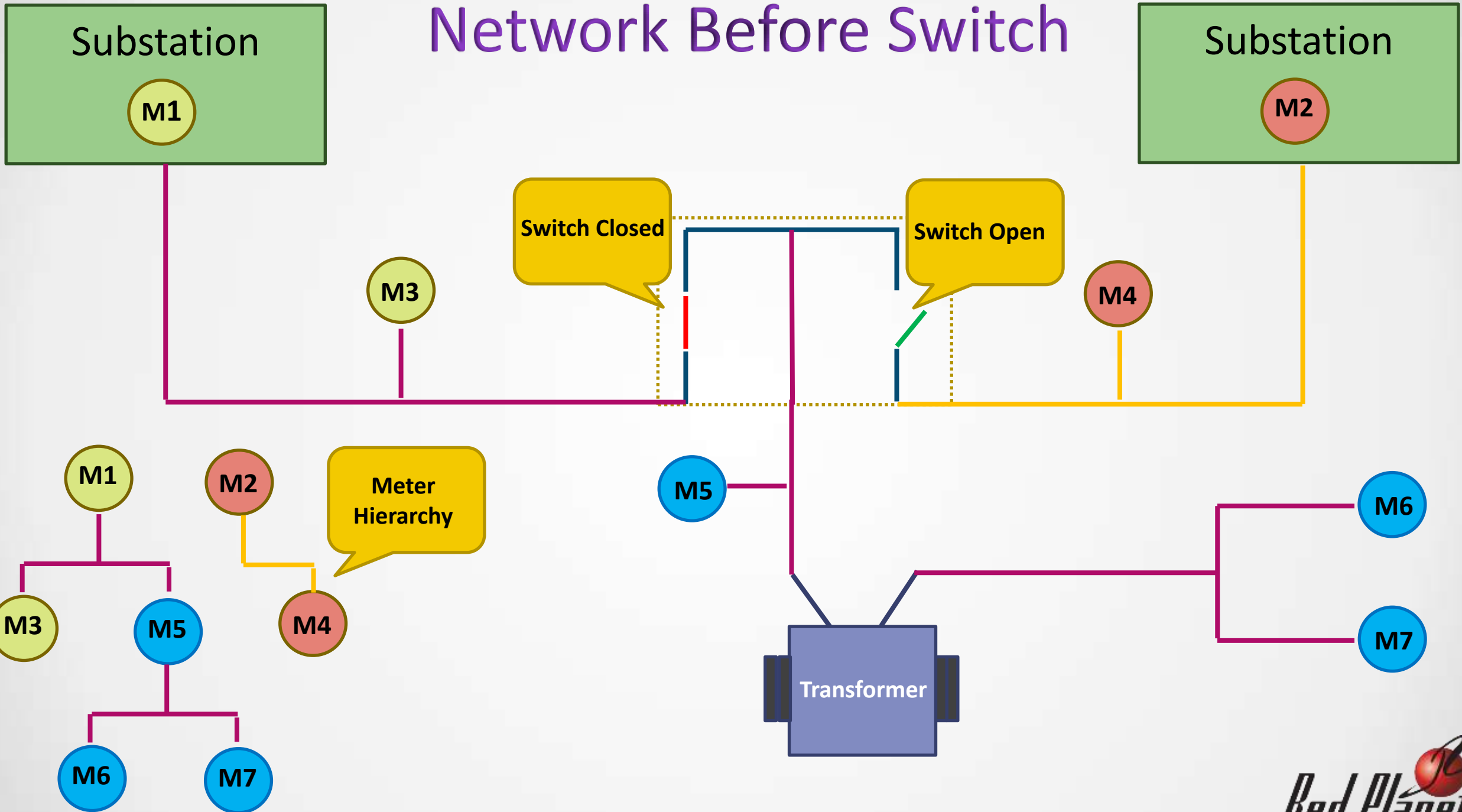
Problem Statement:

In the Existing levels of Hierarchy the “Inspection Area” (Area of Focus) is too big. This is resulting in higher rates of “Resolution Time”

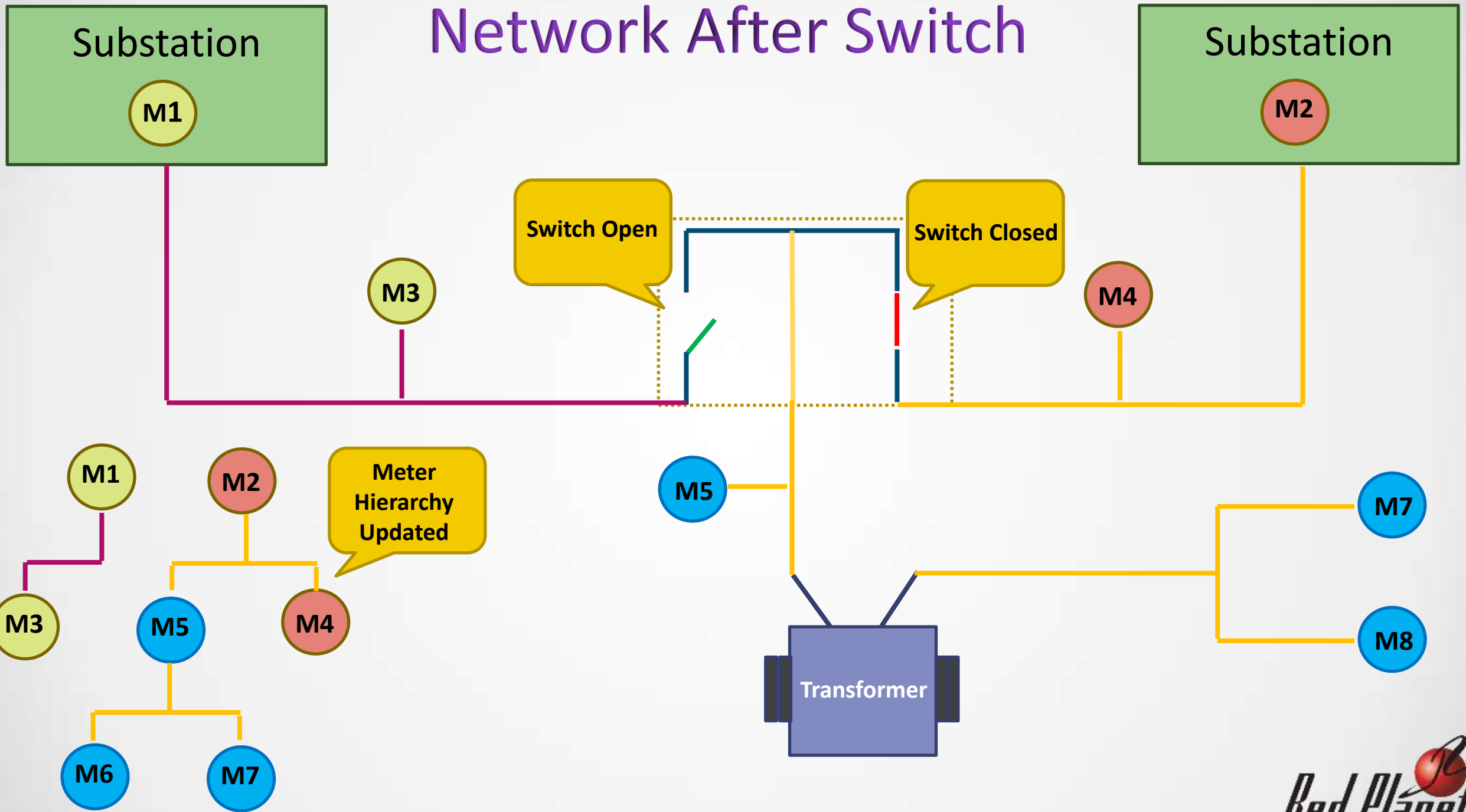
Solution:

Introduce more layers (i.e. Meters) into the Hierarchical Tree in order increase the number of “Audit Sections” thereby reducing the Area of Focus.

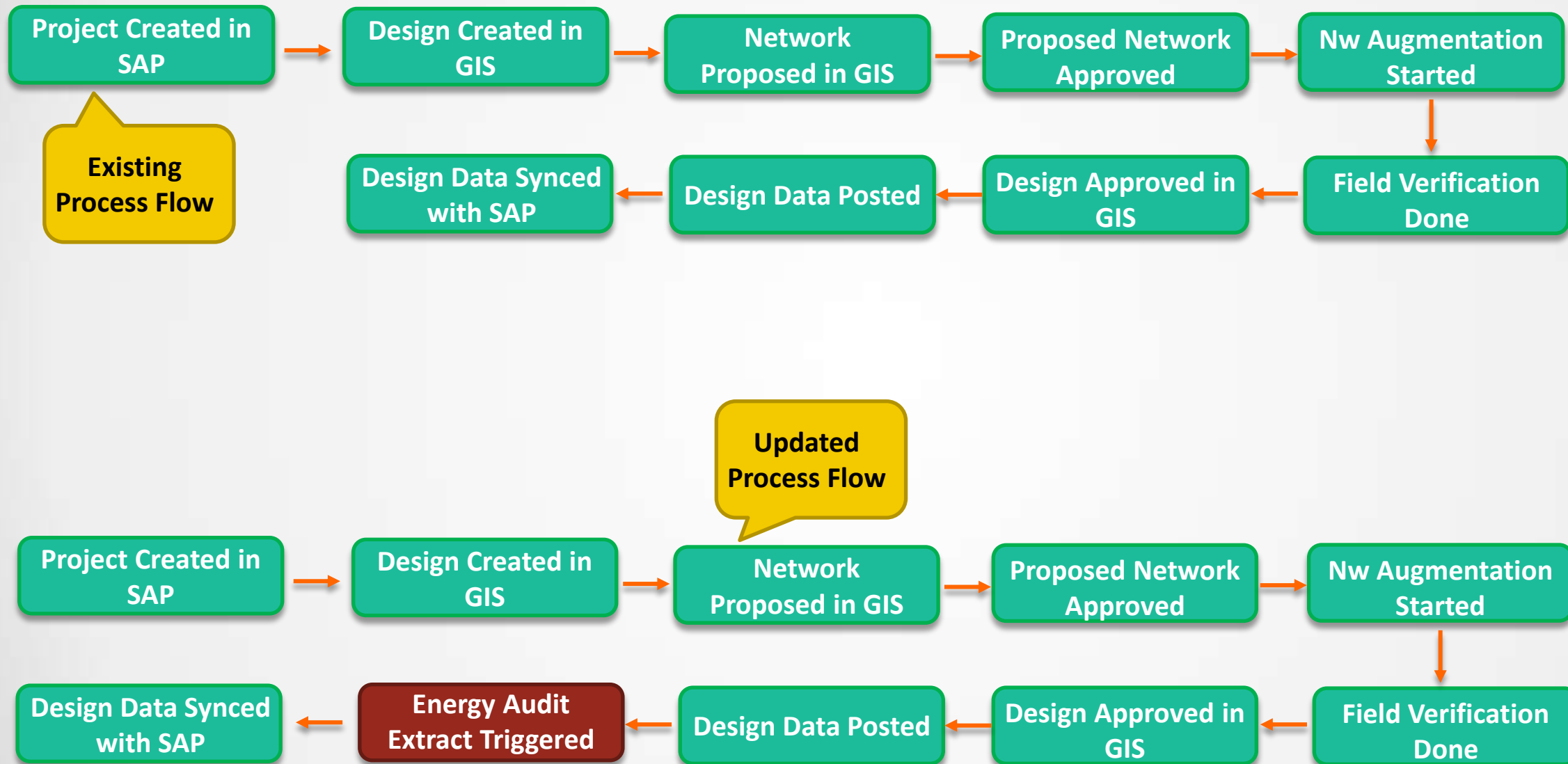
Network Before Switch

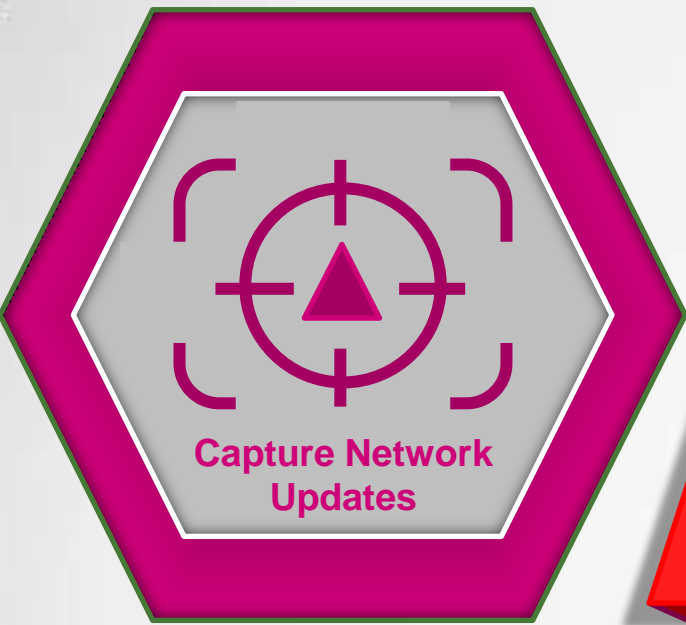


Network After Switch



Network Augmentation Business Process





Problem Statement:

Update the Hierarchical Tree in case of any Network Changes such as Network Extensions, Network Switching, etc.

Solution:

Since all changes made to the network are routed via Business Process, update the Process Flow to trigger Energy Audit extract whenever Network Changes are captured.

Project Advantages

Enhanced Reliability

Since the Data is extract only after going through multiple layers of QAQC, the reliability of Energy Audit Reports is greatly enhanced

Scalable Solution

Solution is designed in such a way that any augmentation to the network (big/small) can easily be captured and passed on to the hierarchical tree.



Reduced Processing Time

Introduction of Additional layers have drastically reduced the Timelines associated with locating the issue

Completely Automated

The triggering, extraction and delivery hierarchical tree is completely automated thereby eliminating any chance of user-related error.



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