Week 8 Seminar – Project Budget

COS10025 – Technology in an Indigenous context project

Acknowledgement of Country

We respectfully acknowledge the Wurundjeri People of the Kulin Nation, who are the Traditional Owners of the land on which Swinburne's Australian campuses are located in Melbourne's east and outer-east, and pay our respect to their Elders past, present and emerging.

We are honoured to recognise our connection to Wurundjeri Country, history, culture, and spirituality through these locations, and strive to ensure that we operate in a manner that respects and honours the Elders and Ancestors of these lands.

We also respectfully acknowledge Swinburne's Aboriginal and Torres Strait Islander staff, students, alumni, partners and visitors.

We also acknowledge and respect the Traditional Owners of lands across Australia, their Elders, Ancestors, cultures, and heritage, and recognise the continuing sovereignties of all Aboriginal and Torres Strait Islander Nations.

Developing project budget – Why?

- The main reason for developing a project budget is to establish a *baseline* for all of the costs of your project

- The project budget is a key artefact in determining the success of your project

- The project budget must be agreed upon by all of the key stakeholders and therefore becomes an *authorised baseline* of the costs of your project.

- Developing a project budget is one of the key stages in managing the overall costs of the project
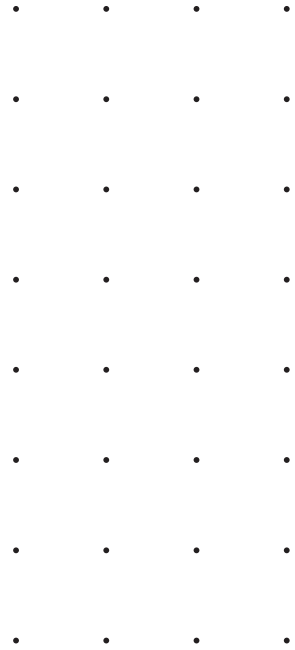
Project budget

1. Focus on the triple constraints
   - Schedule
   - Scope
   - Costs

2. Think about the project from Start to Finish
   - How much money has been allocated?
   - Which expenses are mandatory?
   - Which expenses are not vital for success?
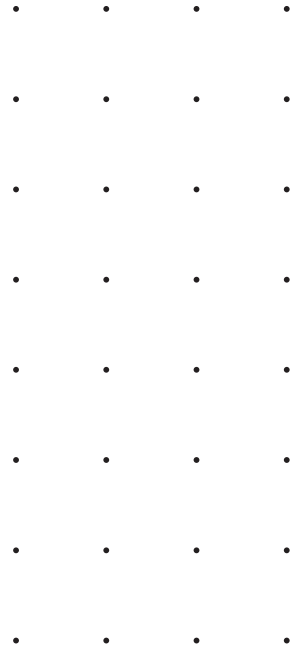   - Can we create realistic estimates?

Project budget

3. Look at the major expenditure

- Materials cost

- Labour cost

- Communications cost

4. Discuss contingency dollars with the team/client

- Unpredictable in a project timeline

- Set aside contingency funds to handle unexpected

Project Cost Management

- Developing/determining a project budget is the middle stage in providing overall cost management for your project.

- First there is an estimating costs

- Second there is determining a project budget and

- Third there is controlling costs

| Estimating Costs | → | Determining a project budget | → | Controlling costs |

Project budget components

Base capital cost estimate includes the following components, and does not incorporate any contingencies or cost escalation:

Direct costs: estimate of the cost of labour, components, devices and sub-contract work required to deliver the asset

Indirect costs: project costs necessary to support the direct costs including the site facilities, project insurances, site management and supervision

Contracting parties' fees: contractors' profit margin and corporate overheads

Project development and associated costs such as fees or taxes, insurance, administration costs

Payments to private sector partners

Advisers and consultants

Project budget components

Life cycle capital cost estimate : Provision of major life cycle maintenance upgrades of the asset(s) over its economic life

Operations and maintenance: Provision for ongoing operating and soft maintenance costs

Escalation: The project's budget should incorporate a specific allowance for a general increase in prices throughout the life cycle. Specific parts of the project's budget may be escalated at different times e.g. consumer price index, wage cost index, building price index etc.

Project risks: The budget should incorporate an additional allowance for project risks

A risk management plan is a document that outlines the potential risks for a major project, and incorporates:

- Identified risks
- likely consequences of these risks
- options to treat and monitor them

Estimating costs

Estimating costs is approximating all of the monetary resources needed to complete the project activities

At the start, you will not know all the costs with accuracy, so you may estimate a Rough Order of Magnitude (ROM) which may be either 20% over or under your number

- For example, you may need a piece of equipment for your project but you don't know whether it costs $1000 or $2000. So it is ok to estimate $1500 for the equipment.

- It is important to estimate ALL costs as much as possible, rather than leaving them out and trying to add them later!

- For example, if you know you will need an electrician to install your equipment, this will come at a cost. If you don't add in this cost to the budget, there may be no money to pay for the electrician and therefore you won't be able to install your equipment!

- To estimate properly, you must understand the scope, schedule, risks and resources required for the project

Rough order of magnitude – example

Prototype cost $2000 2 years ago

Build the same prototype today which will cost roughly 20% to 30% more than $2000

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Estimating costs

A simple estimation sheet is included here.

- Estimates are usually separated into Equipment (Hardware), Software, Labour, Other essential categories
- Labour is often estimated as a Daily or hourly rate (e.g., $50 per hour for 10 hours)
- Always show the tolerance in your estimation (e.g., +/- 20% so that the reader knows the actual costs may be different.

	Qty	Unit cost	$Total
Equipment			
Widget 1	3	$200	$600
Widget 2	1	$3,000	$3,000
IoT Device	1	$3,500	$3,500
Optical Fiber Cable 4 Core Steel = $3.60/- per metre	1000 metres	$3600	$3600
Total			$10,700
Labour			
Project Manager	1 ($70 per hour – 152 hours x $70)	$10,640	$10,640
Technicians	3 ($45 per hour - 96 hours x $45)	$12,960	$12,960
Total Labour			$23,600
Other			
Maintenance	24/7	$760	$760
Telecomms testing	10 faults	$700	$700
Total Other			$1,460
Total Estimate (+20%)			**$42,912**

Developing the project budget

- In a larger project you may not be the one doing the estimating, or you may get different estimates from different stakeholders

- Developing the project budget is the process of receiving the estimates, evaluating them, combining them together and then producing the final baseline total cost of the project
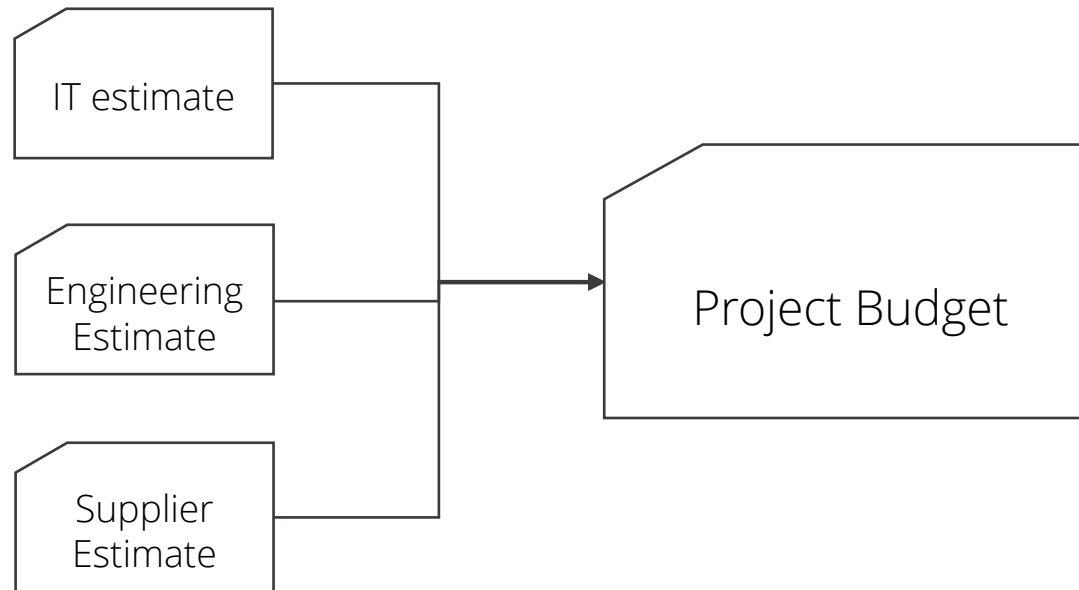
Tools and Techniques for Project Budget

- **Aggregating costs** is important. The project budget does not have to contain a separate line for each estimate. (e.g., if electricity cost estimate is $2000 for one week of the project and $3000 for another week, the electricity cost in the project budget is $5000).

- **Contingency** (or Reserve) is another tool. This is the allowance in the budget for something to go wrong. All projects should have some contingency. (e.g., the total cost of the project may be $100,000 but if the project is risky, then you may allow for 20% contingency. Therefore the total budget for the project is $120,000.

- **Expert Judgement:** Where possible, all estimates and costs should be validated and qualified. The best way to do this is to seek the advice of experts in the organisation or industry. For example a software estimate may have quoted you 30% admin fee for a piece of software, but an IT Consultant tells you that the industry standard is 20%. Therefore, you may ask for the estimate to be resubmitted.

- **Multiple Year Analysis:** Costs for a project may extend over the course of a year. For example a machine may cost $20,000 to buy but we may have to pay maintenance of 20% for 5 years. This may need to be included in the overall project budget

Controlling Costs

- No project will run exactly according to the project budget. There will always be changes and the project budget will need to be updated

- You will need to track costs as they are incurred and make sure they are in line with what is expected

- If costs are predicted to go 'over' (or under) the expected budget, then a project 'variance' or 'change' will need to be raised.

- If the change is authorised, then the project 'baseline' is changed to reflect the additional budget

Project budget - What to consider on costing?

Please do consider on the following for costing

- Wired (physical cable)
  - Twisted paired cables (cost per meter)
  - Coaxial cable (cost per meter)
  - Fiber optic cable (cost per meter)
- Wireless (radio, infrared, satellite)
  - Repeater (retransmits the electronic signal)
  - Hub (connect multiple devices)
  - Satellite dish
- Components
  - Ethernet
  - Modems
  - Access points
  - Switches
  - Terminals (for interconnecting)

Project budget – What not to consider on costing?

- Installing Tower cost
- Installing water treatment plant cost
- Installing Energy generator cost
- Transportation cost
- Other infrastructure (buildings, roadways, dams, bridges) cost
- Satellite cost
- Contractor's cost
- Sub-contracting cost
- Local council cost
- Government bills and Other non-essential costings

Basic Network Architecture

The three-layer hierarchical model contains three layers: **core**, **distribution**, and **access**.

- Level 1 – Access (The access layer enables end user devices such as computers, smart phones and sensors to connect to the network)

- Level 2 – Distribution (The distribution layer connects the access layer to the core layer)

- Level 3 – Core (The core layer is the backbone of the network. Sometimes called the backhaul in cellular networks or the uplink in satellite networks)

Access layer

The access layer is the first layer of the three-layer hierarchical model. This layer allows end users to access the network. This layer also connects user-devices such as PCs, IP phones, wireless access points, printers, and scanners to the network.

The main functions of this layer is connecting various types of end devices to the LAN network.
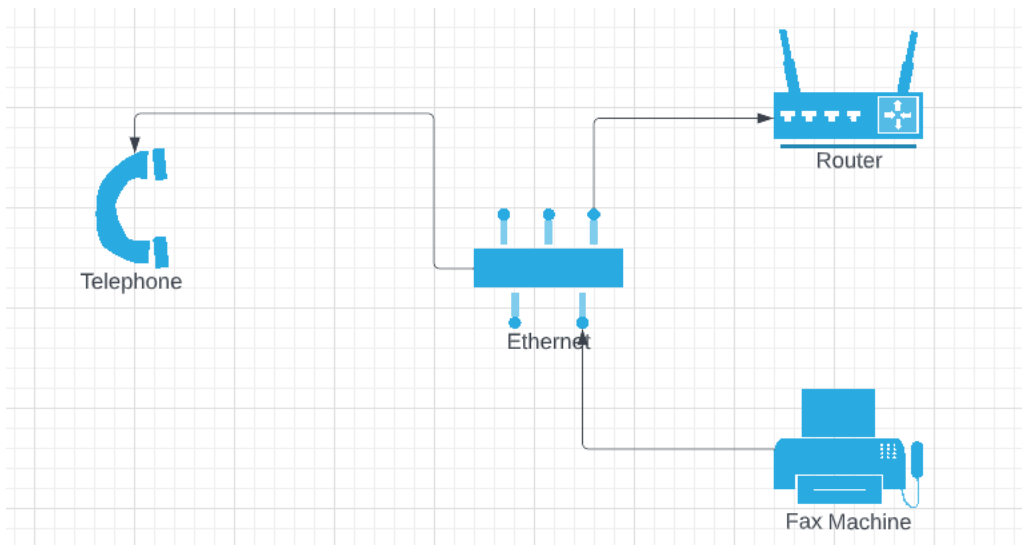
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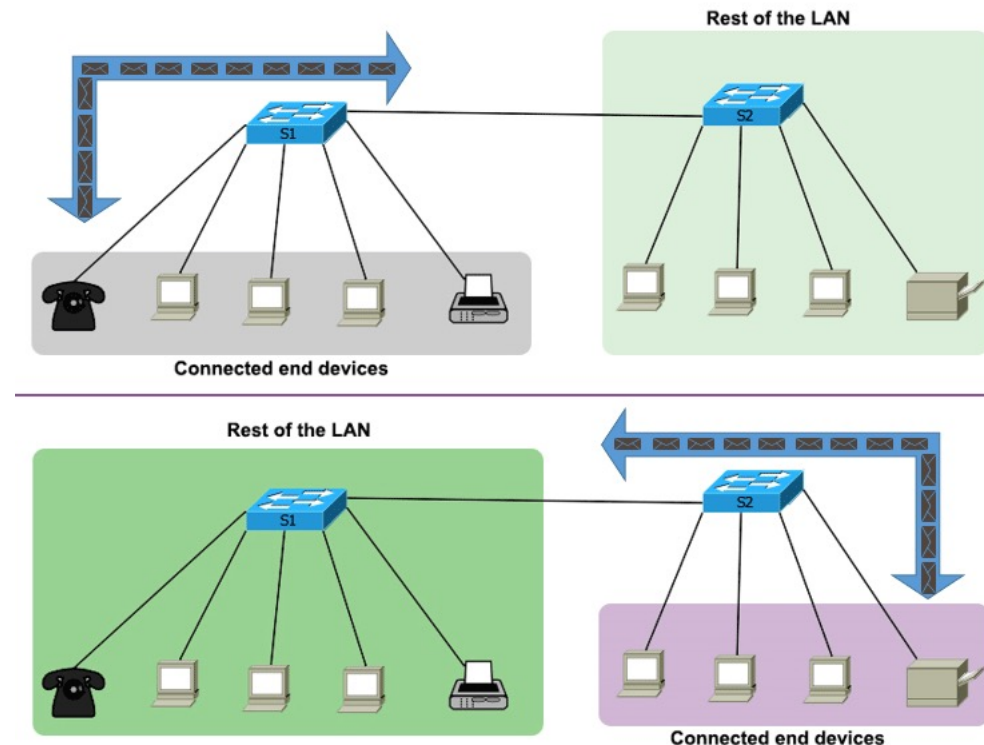
Distribution layer

The distribution layer is the second layer of the three-layer hierarchical model. Switches connected in this layer are known as the *distribution* switches. Unlike access switches, distribution switches do not provide any service to end devices. Distribution switches connect the access switches.

The main functions of the distribution layer switches is to provide connectivity between the access layer switches
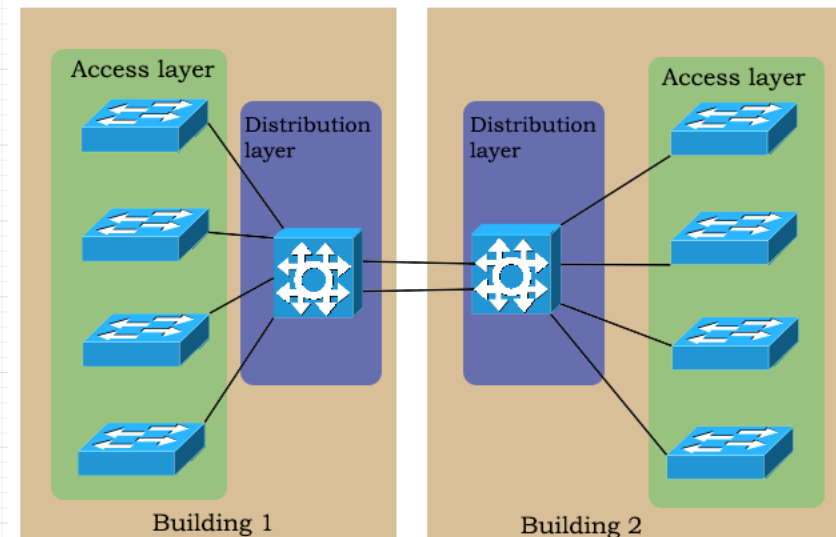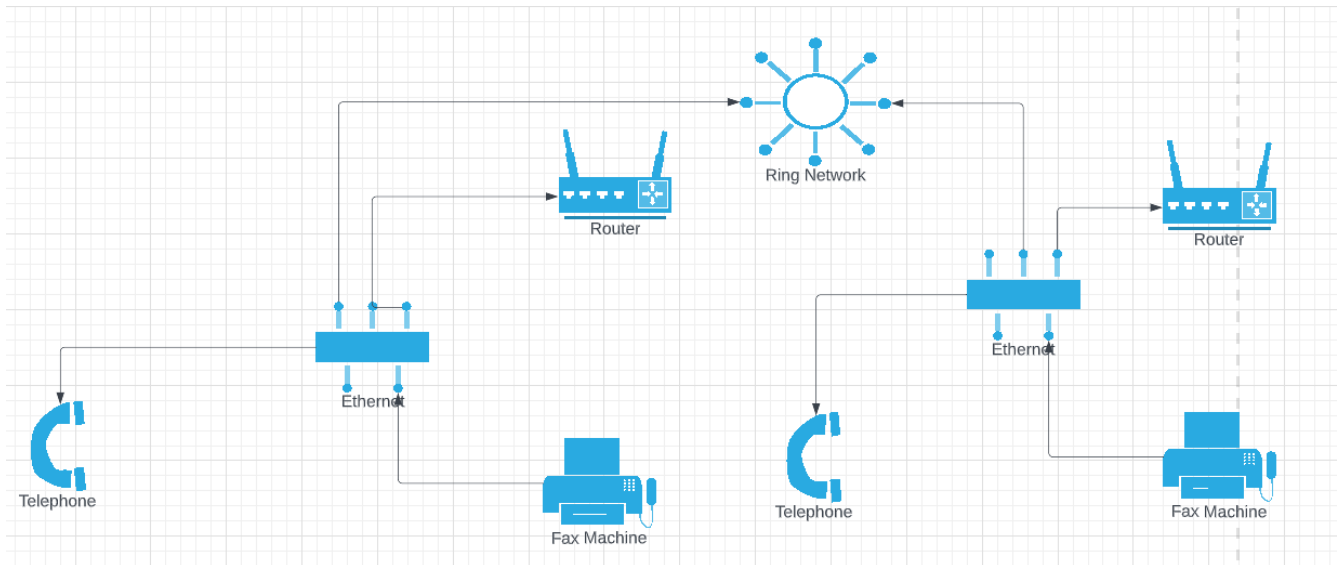
Core layer

This is the third layer of the three-layer hierarchical model. Switches that work in this layer are known as the *core switches*. Core switches connect distribution switches.

In a complex and large network, core switches reduce cabling needs and switch ports while still allowing all devices to send data to all other devices in the LAN.
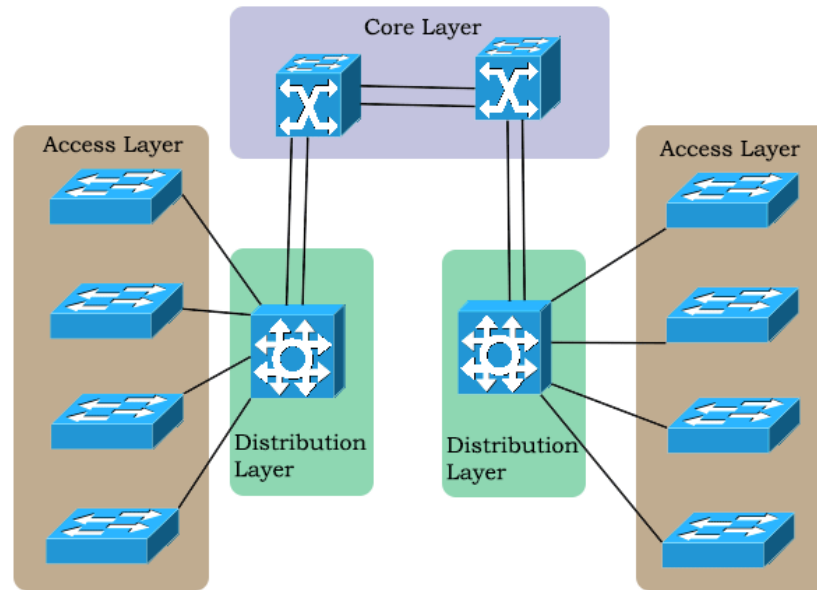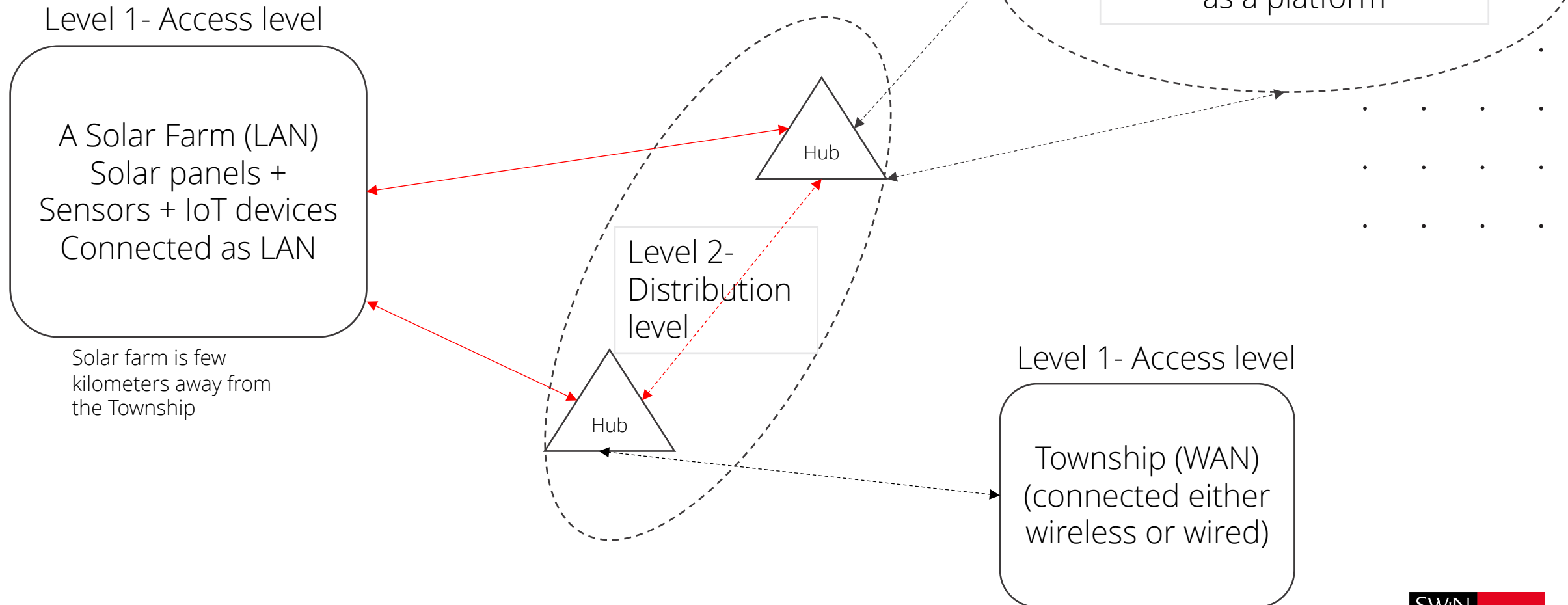
Core layer

In the below figure, MPLS Multiprotocol label switching is a networking technology that acts as a core layer that directly connect distribution switches
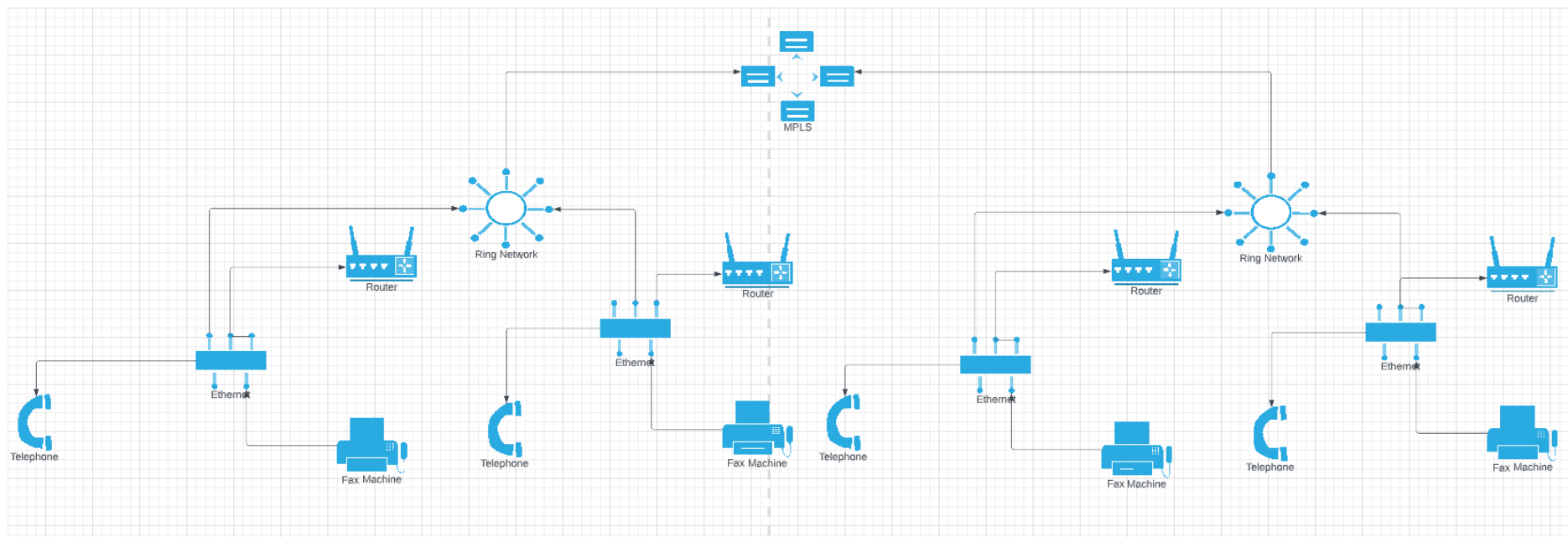
An example – Energy as a learning issue

This example is a conceptual understanding of the basic network architecture for a learning issue

Level 1- Access level

A Solar Farm (LAN)
Solar panels +
Sensors + IoT devices
Connected as LAN

Solar farm is few kilometers away from the Township

Level 3- Core level
Connected with a Tower as a platform

Hub

Level 2- Distribution level

Hub

Level 1- Access level

Township (WAN)
(connected either wireless or wired)

Based on number of users, signal range, strength, connectivity of devices, distribution of users, available infrastructure, purpose of the network.

Activity

Estimate the budget for each design idea
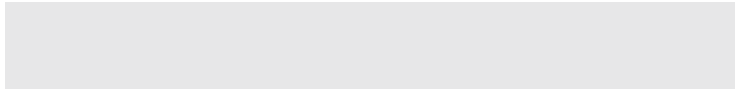
Activity

Aim : Estimate the budget for each design idea

Instructions : 1. Estimate costs (approximately) of the monetary resources needed to complete the project activities.
2. Evaluating each and every cost, and combine those together.
3. Produce the final baseline total cost of each design idea.
4. Repeat the process for all design ideas.

Teamwork: **20-30 minutes**