Traditional LAN vs Passive Optical LAN TCO Study

Business Case - Scope

This business model helps evaluate and compare the overall TCO for two deployment Options - Traditional LAN and Passive Optical LAN (over a duration of 5 Years) within a sample building.

We have considered 6 different scenarios, below is details of scenarios considered:

Scenario 1: Greenfield, 4 Floors Building , 4 Port ONT with 90 Users / Floor

Scenario 2: Greenfield, 7 Floors Building , 4 Port ONT with 150 Users / Floor

Scenario 3: Brownfield, 4 Floors Building , Re-use TR Room (Racks), Cabling & Tray Infra, 4 Port ONT with 90 Users / Floor

Scenario 4: Brownfield, 7 Floors Building , Re-use TR Room (Racks), Cabling & Tray Infra ,4 Port ONT with 150 Users / Floor

Scenario 5: Brownfield, 4 Floors Building , Structured Cabling Reuse (VR Cable) ,24 Port ONT with 90 Users / Floor

Scenario 6: Brownfield, 7 Floors Building , Structured Cabling Reuse (VR Cable) ,24 Port ONT with 150 Users / Floor

Business Case - Inclusions

For TCO Calculations of 6 different scenarios, below is list of TCO inclusions for Traditional LAN and POL:

1. ONTs plus Wi-Fi Access Points vs only Wi-Fi Access Points per Building considered.

2. Traditional LAN considers deployment of below equipment:
   Core Switch, Access Switch ,Vertical Riser Fiber Cable , CAT6 Cable and Wi-Fi Access Points.

3. Passive Optical LAN considers deployment of below equipment:
   OLT, Vertical Riser Fiber Cable, Splitters, Drop Fiber Cable, CAT6 Cable (ONT to Wi-Fi) ,ONTs and Wi-Fi Access Points.

4. For overall TCO calculations below aspects have been considered:
   Hardware CAPEX
   Deployment / Services Cost
   OPEX : Power Consumption , Rental , Maintenance etc.

Business Case Assumptions – Scenario Specific Inputs (1)

Scenario No.	Scenario Type	No. of Floors	ONT Ports	Cabling Infra, Trays & Racks Re-Use	Structured Cabling Re-Use
1	**Green Field**	**4**	**4**	**No**	**No**
2	**Green Field**	**7**	**4**	**No**	**No**
3	**Brown Field**	**4**	**4**	**Yes**	**No**
4	**Brown Field**	**7**	**4**	**Yes**	**No**
5	**Brown Field**	**4**	**24**	**No**	**Yes**
6	**Brown Field**	**7**	**24**	**No**	**Yes**

Business Case Assumptions – Common Inputs (1)

Key Inputs

Floor Length	Mtr.	50
Floor Width	Mtr.	20
Floor Height	Mtr.	4

Traditional LAN Inputs

Core Switch

Ports per Core Switch	Count	48
No. of AC per Core Switch	Count	1
Power Consumption per Core Switch	W	600

		CAPEX	**IMPEX**
Core Switch Price	USD	8000	1000

Maintenance as % of CAPEX+IMPEX	%	5%

Business Case Assumptions- Common Inputs (2)

Traditional LAN Inputs

Access Switch + Wi-Fi Access Points

Ports per Access Switch	Count	48	
No. of AC per Access Switch	Count	0.5	
Power Consumption per Access Switch	W	70	
		CAPEX	**IMPEX**
Access Switch Price	USD	2500	338
Wi-Fi Access Point			
Coverage Radius of Each Wi-Fi Access Point	Mtr.	5	
Power Consumption per Wi-Fi Access Point	W	5	
		CAPEX	**IMPEX**
Wi-Fi Access Point Price (including Wall Mounted Kit, RJ45 Cable & PSU)	USD	50	10
Maintenance as % of CAPEX+IMPEX	%	5%	

Cabling

		CAPEX	**IMPEX**
Vertical Riser Cable Price (12F)	USD/Meter	1.7	1.5
Horizontal Drop CAT6 / LAN ~ 45 Mtr. Cable Price (LAN)	USD/Meter	14	1.5
ODF price	USD	1500	100
Patch Chord – 5 Mtr. Price	USD	10	1
Cable Trays and Conduits Cost	USD/Meter	10	5

Business Case Assumptions- Common Inputs (3)

Passive Optical LAN Inputs

OLT

Line Cards per OLT Chassis	Count	8	
Ports per Line Card	Count	16	
Power Consumption per PON Port	W	10	
No. of AC per OLT	Count	1	
		CAPEX	**IMPEX**
Chassis Price	USD	3000	1000
Line Card Price	USD	10000	400
Maintenance as % of CAPEX+IMPEX	%	5%	

ONT + Wi-Fi CPE

Power Consumption per ONT	W	5	
Coverage Radius of Each Wi-Fi Access Point	Mtr.	5	
Power Consumption per Wi-Fi Access Point	W	5	
		CAPEX	**IMPEX**
ONT Price (including Wall Mounted Kit, RJ45 Cable & PSU)	USD	75	15
Wi-Fi Access Point Price (including Wall Mounted Kit, RJ45 Cable & PSU)	USD	50	10
Maintenance as % of CAPEX+IMPEX	%	5%	

Business Case Assumptions- Common Inputs (4)

Passive Optical LAN Inputs

Splitting Inputs

Topology Type	Type	Single Stage – Non-Optimized
Split Ratio	Ratio	1:32
L1 Split Ratio	Ratio	1:32
S1 Splitter Price	USD	150

Cabling

CAT6 / LAN Cable Length per Wi-Fi CPE from each ONT	Meter	10	
		CAPEX	**IMPEX**
Vertical Riser Cable Price (12F)	USD/ Meter	1.7	1.5
Horizontal / Drop Cable Price (2F~ 45 Meter)	USD/ Meter	0.22	1.5
Indoor Wall Mount Enclosure Box for Splitter Installation	USD	100	50
ODF Price	USD	1500	100
Cable Trays and Conduits Cost	USD/Meter	10	5

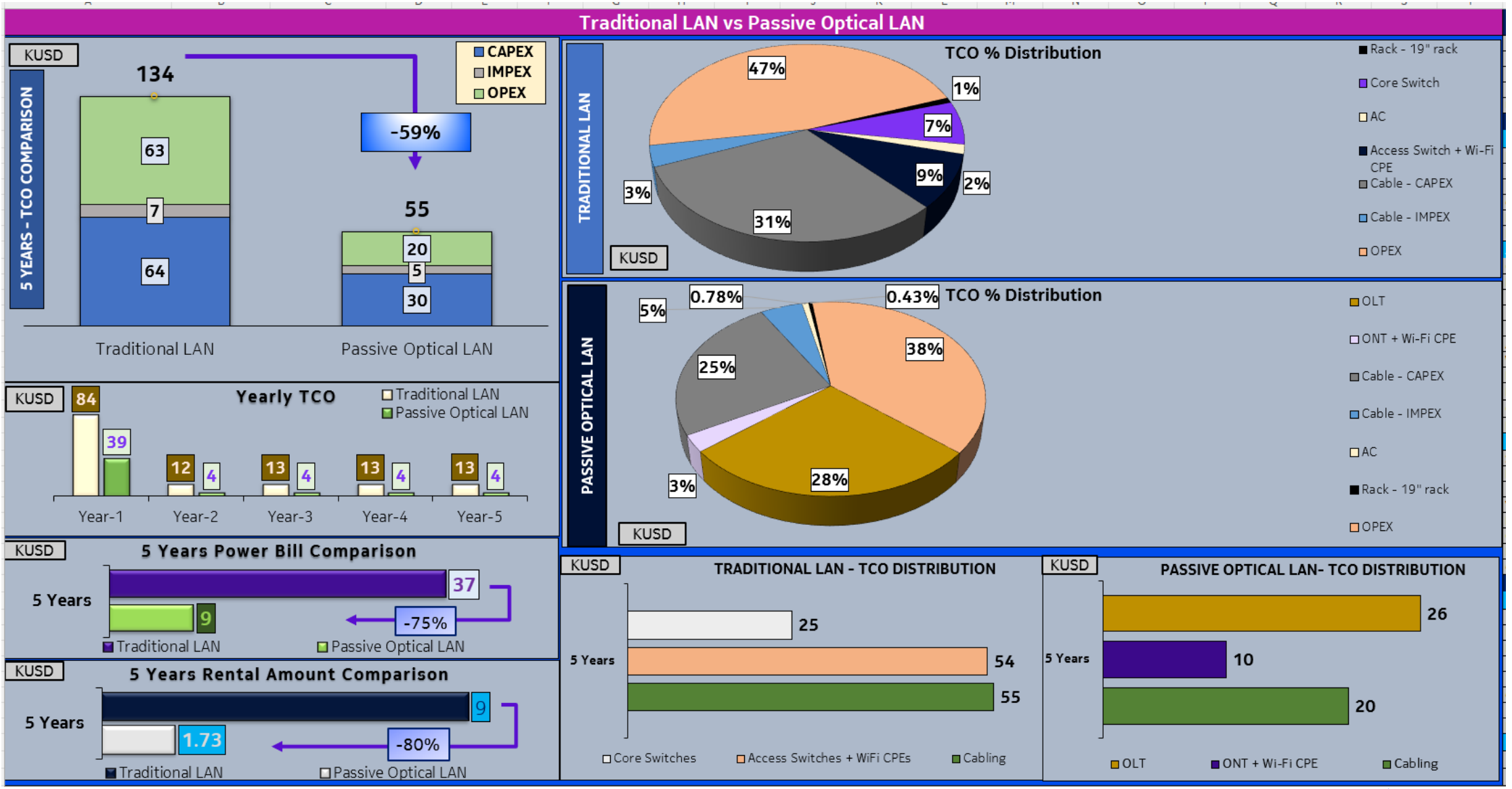
Business Case Assumptions- Common Inputs (5)

Other TCO Inputs

RENTAL			
Rent per Sq. m per Month	USD	40	
POWER			
Power Tariff Rate	USD/kWH	0.22	
% Yearly increase in Power Tariff	%	1.5%	
AC			
AC Price (including installation accessories & charges)	USD	400	
Power Consumption per AC	kW	0.5	
FREE STANDING RACK			
		CAPEX	**IMPEX**
Rack – 19” Rack Price	USD	200	20

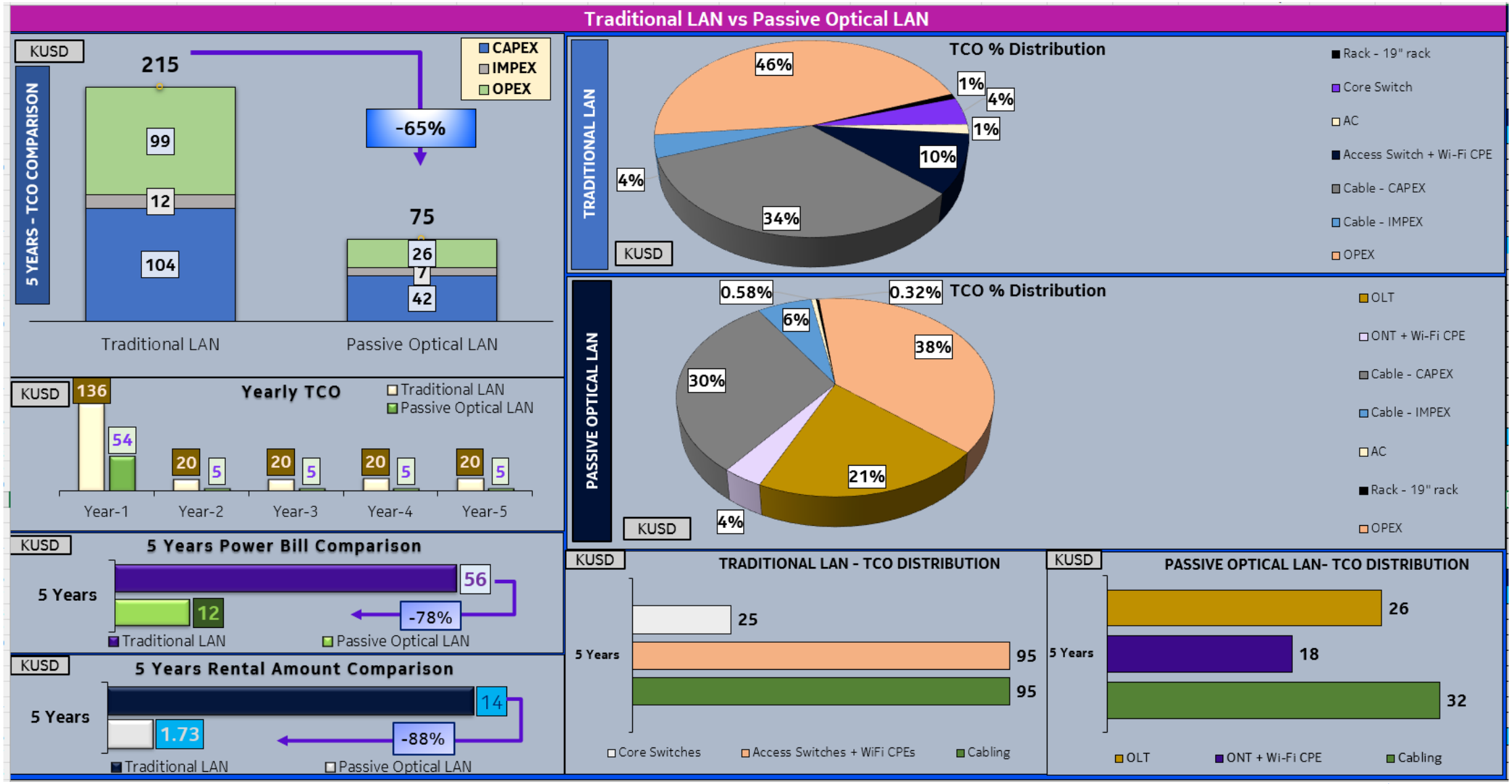
Business Case Results – Scenario1

Greenfield, 4 Floors, 4 Port ONT, 90 Users / Floor



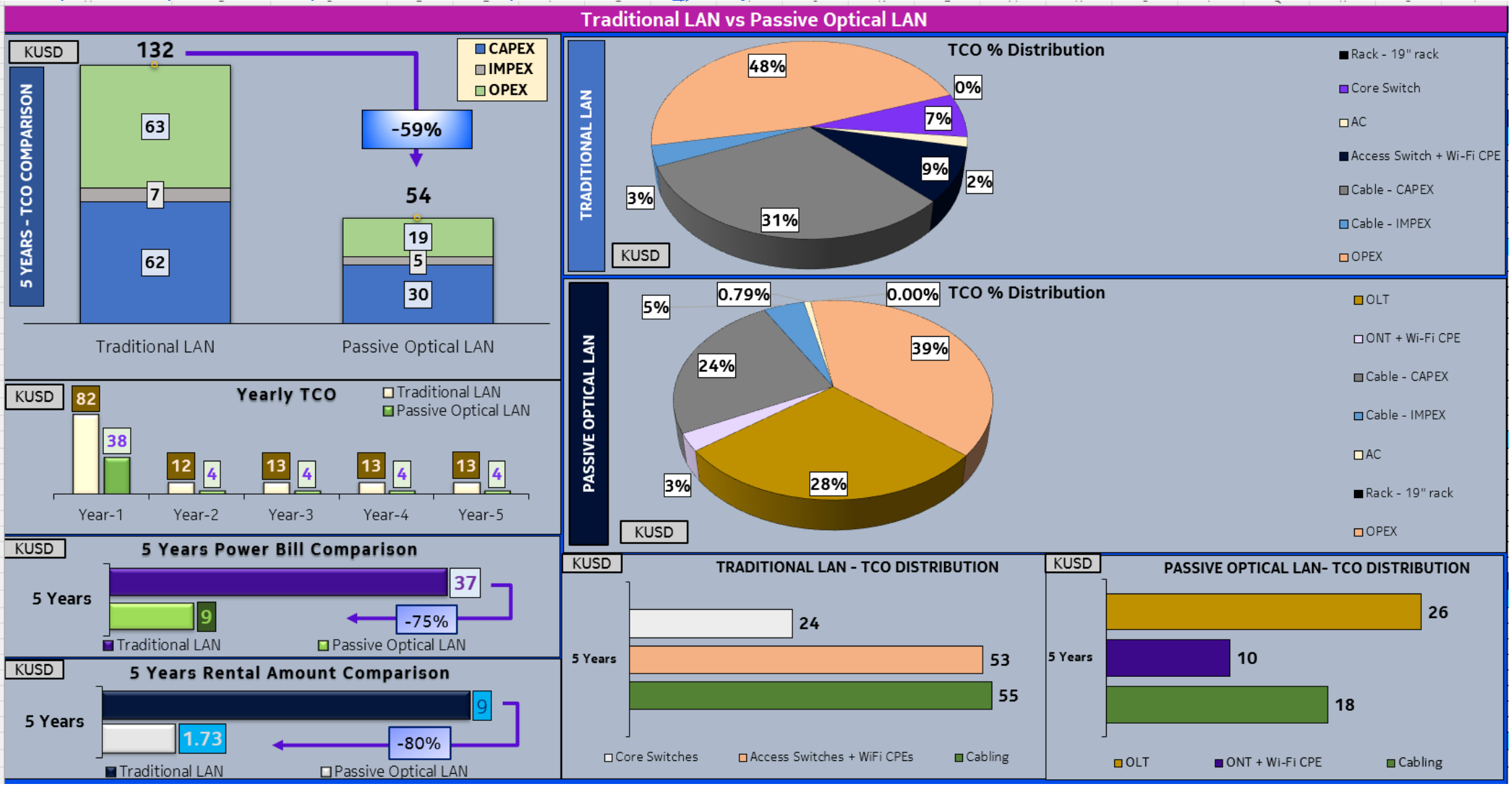
Business Case Results – Scenario 2

Greenfield, 7 Floors, 4 Port ONT, 150 Users / Floor



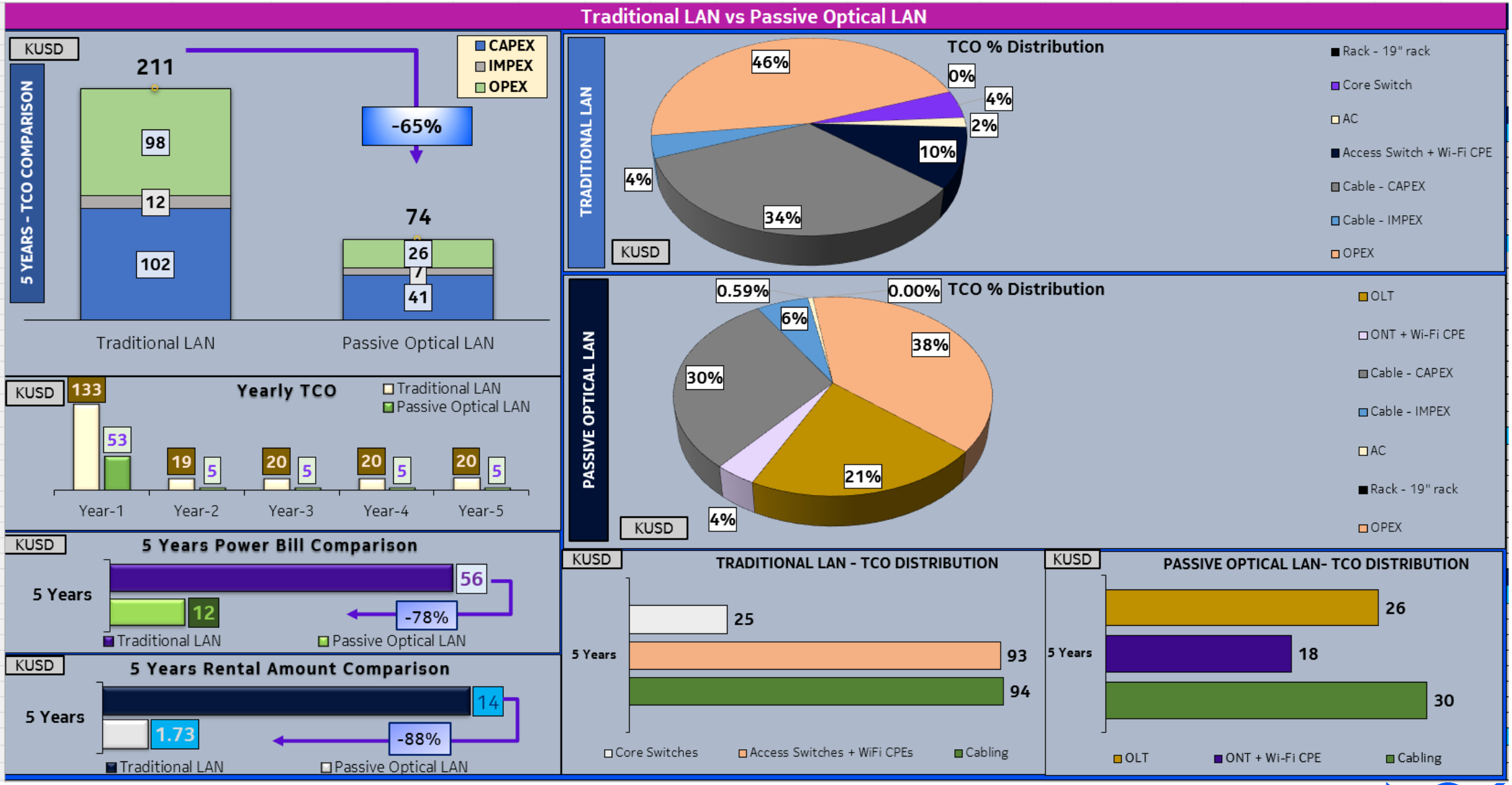
Business Case Results – Scenario 3

Brown field, 4 Floors, 4 Port ONT, 90 Users / Floor, Reuse Cabling, Tray & TR Room



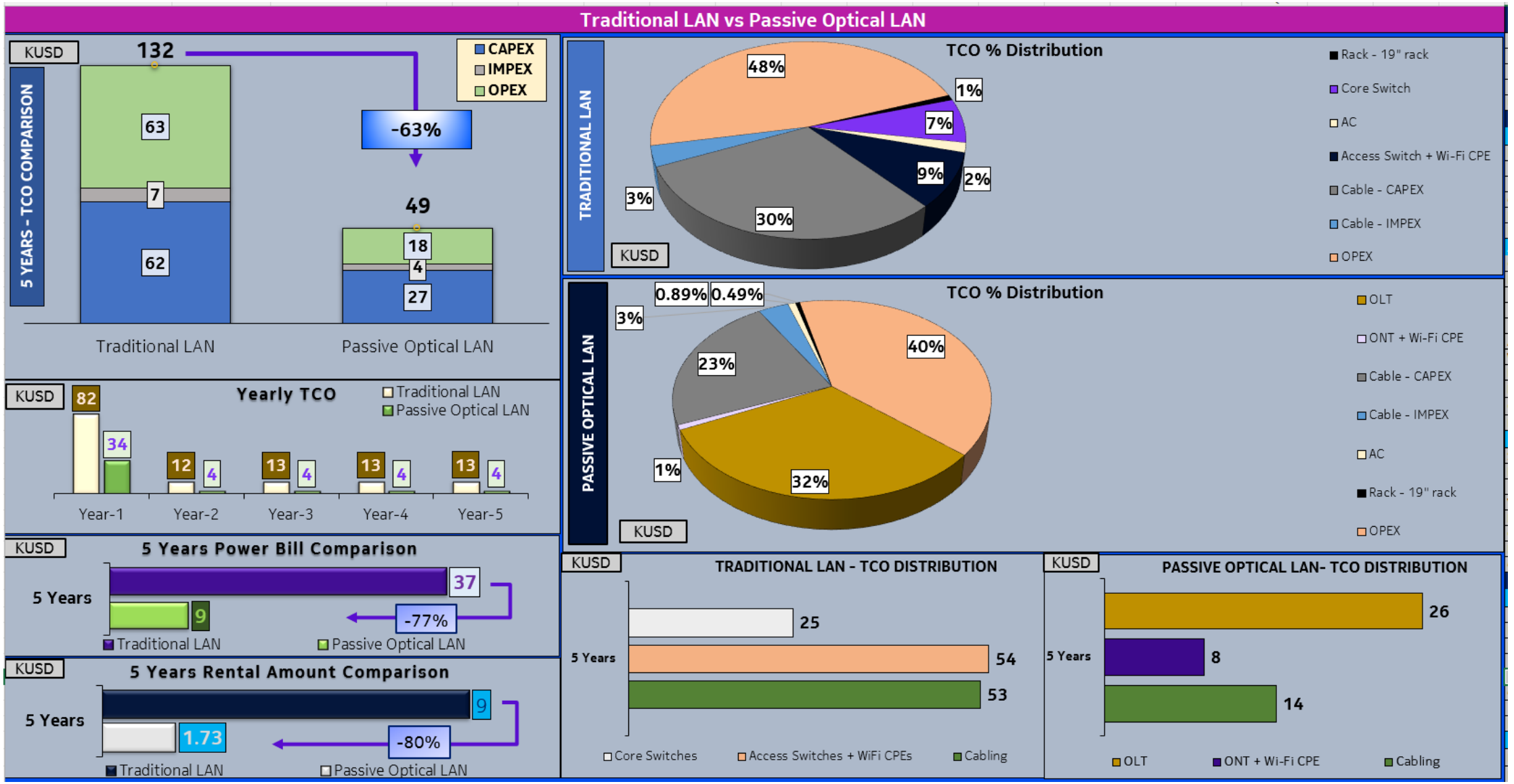
Business Case Results – Scenario 4

Brown field, 7 Floors, 4 Port ONT, 150 Users / Floor, Reuse Cabling, Tray & TR Room



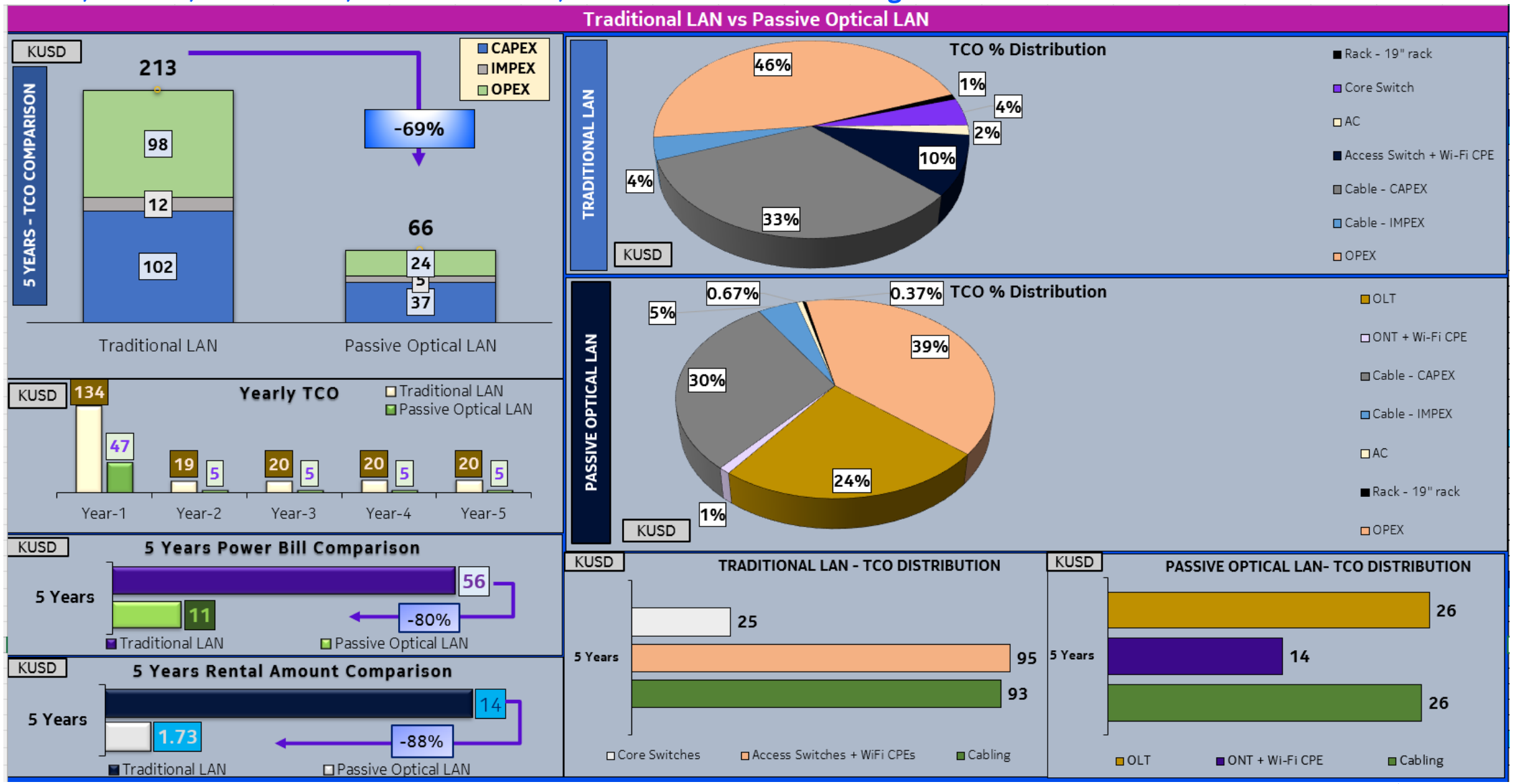
Business Case Results – Scenario 5

Brown field, 4 Floors, 24 Port ONT, 90 Users / Floor, Reuse Structured VR Cabling



Business Case Results – Scenario 6

Brown field, 7 Floors, 24 Port ONT, 150 Users / Floor, Reuse Structured VR Cabling



Backup Slides

Topology Diagram and BoQ

Business Case- Sample BoQ (1) – Traditional LAN

Traditional LAN

Scenario No.	Scenario Type	No. of Floors	Users / Floor	Cabling Infra, Racks & Trays Re-Use	Structured Cabling Re-Use	Core Switch/ Building	Access Switch/ Building	Avg. Users / Wi-Fi Access Point	Wi-Fi Access Point / Building	TR Rooms (New Racks)	Structured Cabling (New 12F VR Cable Count/ Building)	VR Cable Length (meter)/ Building	Horizontal CAT 6 Cable Length (meter)/ Building
1	Green Field	4	90	No	No	1	4	6	60	5	1	48	2700
2	Green Field	7	150	No	No	1	7	10	105	8	2	77	4725
3	Brown Field	4	90	Yes	No	1	4	6	60	0	1	48	2700
4	Brown Field	7	150	Yes	No	1	7	10	105	0	2	77	4725
5	Brown Field	4	90	No	Yes	1	4	6	60	5	0	0	2700
6	Brown Field	7	150	No	Yes	1	7	10	105	8	0	0	4725

Input Value

Calculated Value

Business Case - Sample BoQ (2) – Passive Optical LAN

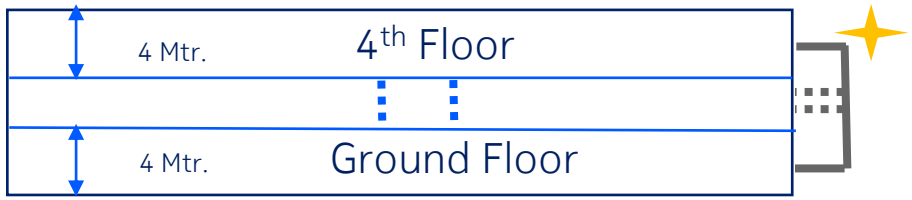
Passive Optical LAN

Scenario No.	Scenario Type	No. of Floors	Cabling Infra & Trays Re-Use	Ports / ONT	Users / Floor	Structured Cabling Re-Use	OLT / Building	ONT / Building	Avg. Users / Wi-Fi Access Point	Wi-Fi Access Point / Building	TR Rooms (New Racks)/ Building	Structured Cabling (New 12F VR Cable Count/ Building)	VR Cable Length (meter)/ Building	Horizontal Drop Cable Length (meter)/ Building
1	Green Field	4	No	4	90	No	1	16	6	60	1	1	48	720
2	Green Field	7	No	4	150	No	1	28	10	105	1	2	77	1260
3	Brown Field	4	Yes	4	90	No	1	16	6	60	0	1	48	720
4	Brown Field	7	Yes	4	150	No	1	28	10	105	0	2	77	1260
5	Brown Field	4	No	24	90	Yes	1	4	6	60	1	0	0	180
6	Brown Field	7	No	24	150	Yes	1	7	10	105	1	0	0	315

Input Value

Calculated Value

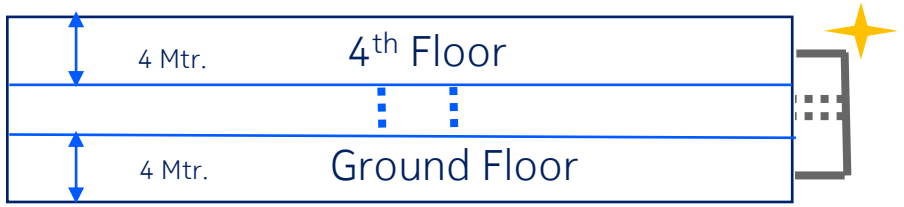
Traditional LAN – 4 Floor Vertical Riser Cable Map



12F (Vertical Riser Cable runs from Ground Floor connecting till 4th Floor Access Switch and other VR cable for redundancy

Vertical Riser Cable not considered in case of Brown Field Structured Cabling Re-Use (Scenario- 5 & 6)

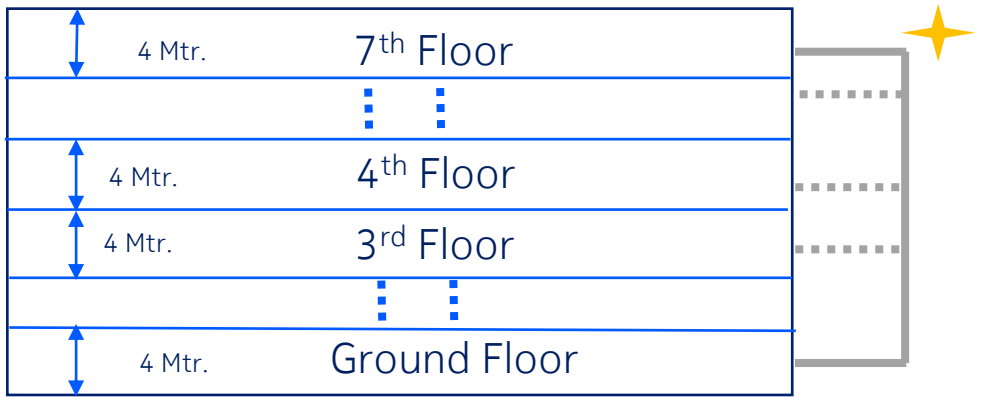
Passive Optical LAN – 4 Floor Vertical Riser Cable Map



12F (Vertical Riser Cable runs from Ground Floor connecting till 4th Floor Splitter and other VR Cable for redundancy

Vertical Riser Cable not considered in case of Brown Field Structured Cabling Re-Use (Scenario- 5 & 6)

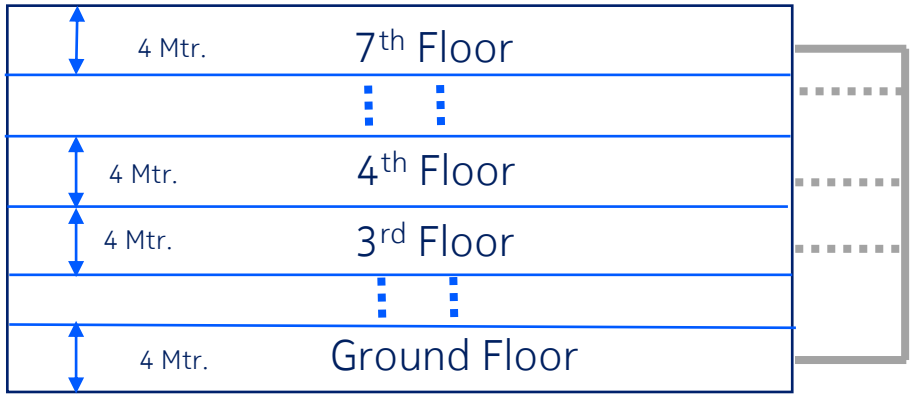
Traditional LAN – 7 Floor Vertical Riser Cable Map



12F (Vertical Riser Cable runs from Ground Floor connecting till 7th Floor Access Switch and other VR cable for redundancy

Vertical Riser Cable not considered in case of Brown Field Structured Cabling Re-Use (Scenario- 5 & 6)

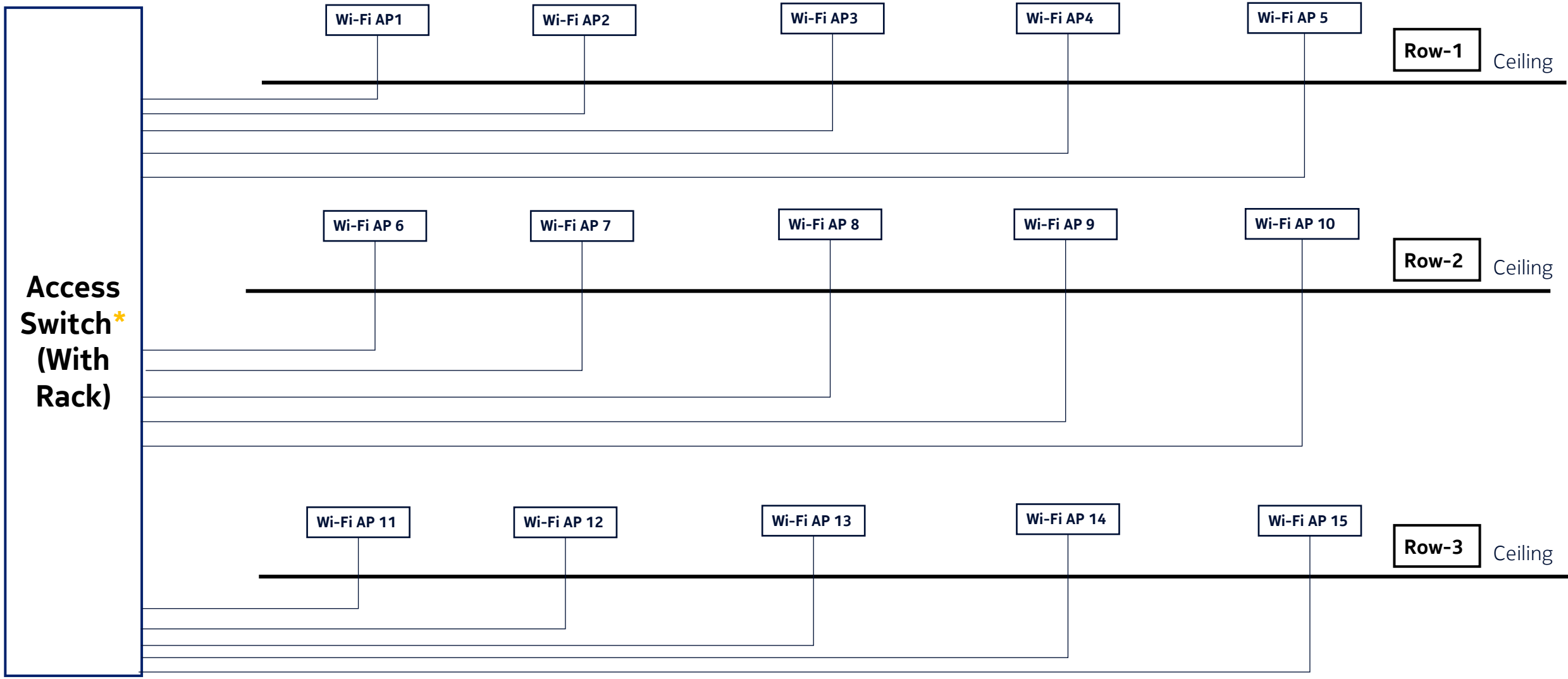
Passive Optical LAN – 7 Floor Vertical Riser Cable Map



12F (Vertical Riser Cable runs from Ground Floor connecting till 7th Floor Splitter and other VR cable for redundancy

Vertical Riser Cable not considered in case of Brown Field Structured Cabling Re-Use (Scenario- 5 & 6)

Traditional LAN – Horizontal Cable Floor Map

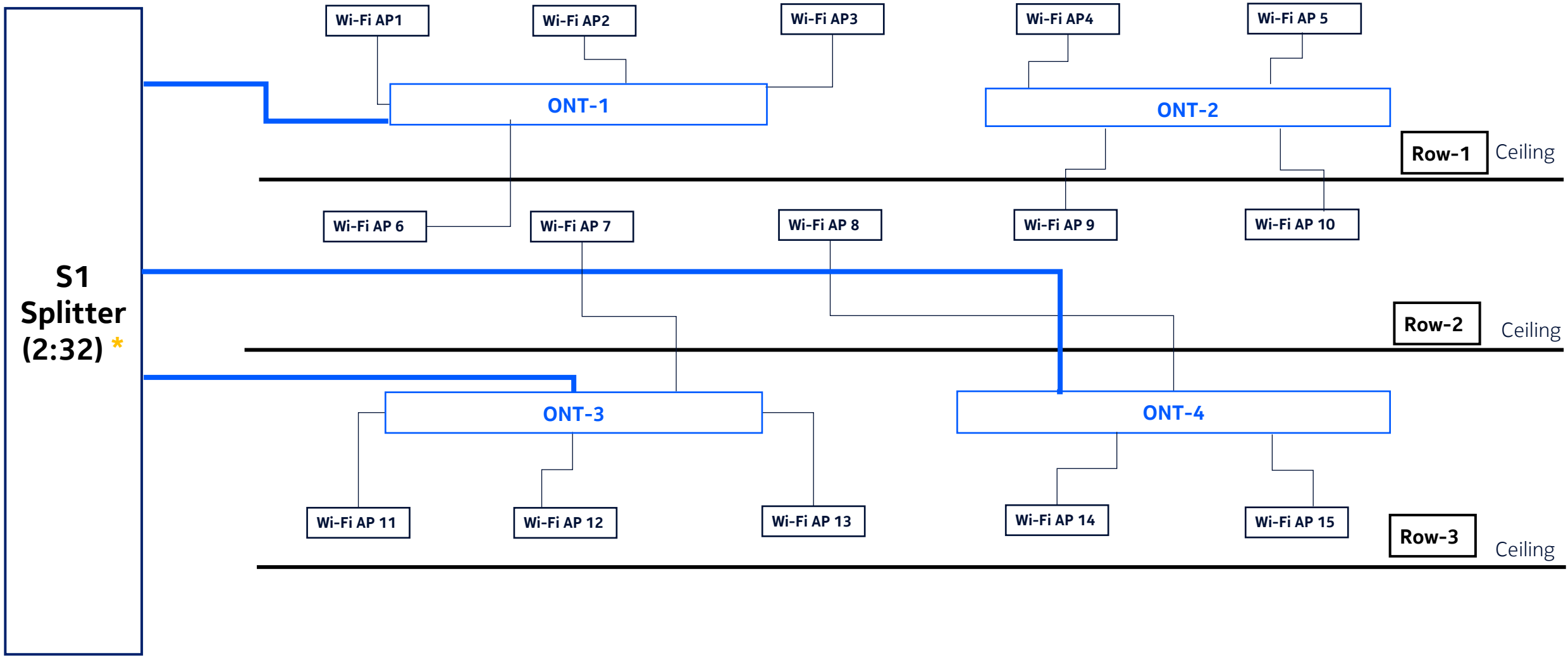


CAT6 Cable (LAN) ~ 45 Mtr.

* Each Access Switch is housed in a rack with AC

Passive Optical LAN – Horizontal Cable Floor Map (1)

Ports / ONT=4



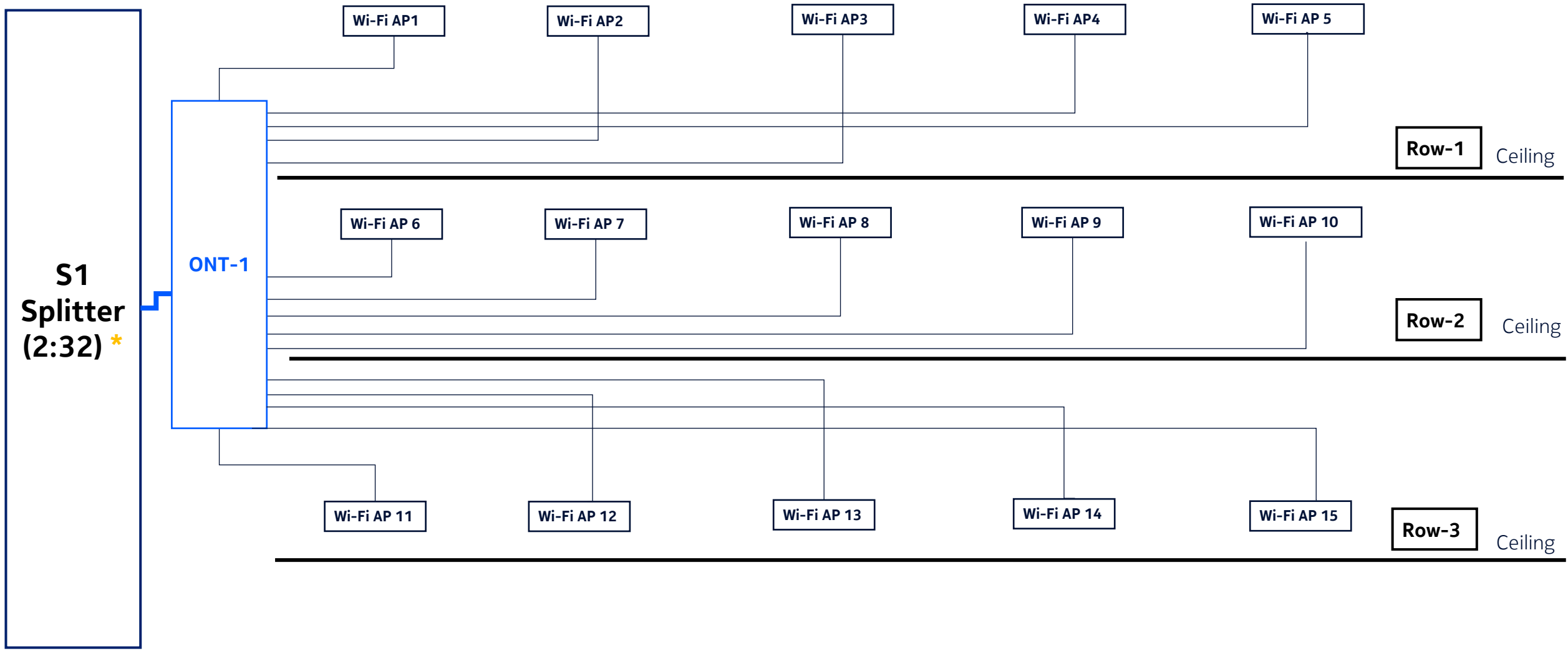
CAT6 Cable (LAN) ~ 10 Mtr. (ONT to Wi-Fi AP)

Drop cable (2F ~ 45 Mtr.)

* Each Splitter installed in an indoor wall mount enclosure box

Passive Optical LAN – Horizontal Cable Floor Map (2)

Ports / ONT=24



CAT6 Cable (LAN) ~ 10 Mtr. (ONT to Wi-Fi AP)

Drop cable (2F ~ 45 Mtr.)

* Each Splitter installed in an indoor wall mount enclosure box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