



Fiber Link Design & Power Budget Report

Horizon Fiber Networks Inc.

Designed by Miguel Santos
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Demo Link — Horizon Tower to Bayfront Campus

Revision 1.0

Planned / Design

FAIL

Circuit / Link ID: CIR-2026-DEMO-001

Site A: Horizon Tower POP

Site B: Bayfront Campus Node

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PROTECTED CIRCUIT · 3 PATHS

● Primary ● Protection ● Auxiliary

Signature over printed name / Date

Signature over printed name / Date

Design Engineer: Miguel Santos
Senior Fiber Network Engineer

Approver: Alexandra Reyes
Head of Network Infrastructure

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Parties	
Design Engineer	Miguel Santos — Senior Fiber Network Engineer
Client	Skyline Data Centers Corp. — projects@skylinedc.example
Dark Fiber Carrier	LuzViMin Dark Fiber Co. — wholesale@lvmdark.example Ref: DF-2026-0417
Site A	Horizon Tower POP 88 Lightwave Avenue, Makati City
Site B	Bayfront Campus Node 1 Esplanade Drive, Pasay City

Sites			
	Name	Address	Owner
1	Horizon Tower POP	88 Lightwave Avenue, Makati City	Horizon Fiber Networks Inc.
2	Bayfront Campus Node	1 Esplanade Drive, Pasay City	Skyline Data Centers Corp.
3	Eastgate Data Hub	12 Ortigas Avenue, Pasig City	Metro Interconnect Corp.
4	Riverside Access Node	5 Riverbank Road, Mandaluyong City	Metro Interconnect Corp.

Links & Protection Summary				
Horizon Tower POP — Bayfront Campus Node				
Path	Route + Slack	Link loss (worst-case)	Headroom	Verdict
● Primary	10.37 km	3.69 dB	6.41 dB	PASS
● Protection	12.11 km	6.14 dB	14.86 dB	FAIL
Eastgate Data Hub — Riverside Access Node				
● Auxiliary	9.81 km	8.02 dB	-4.82 dB	FAIL

Each site pair is a protected circuit; the combined verdict passes only when every designed path passes.

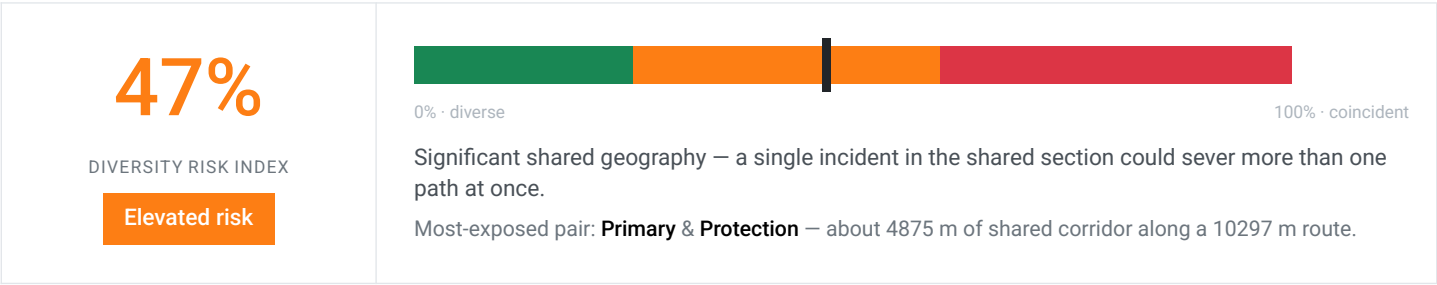
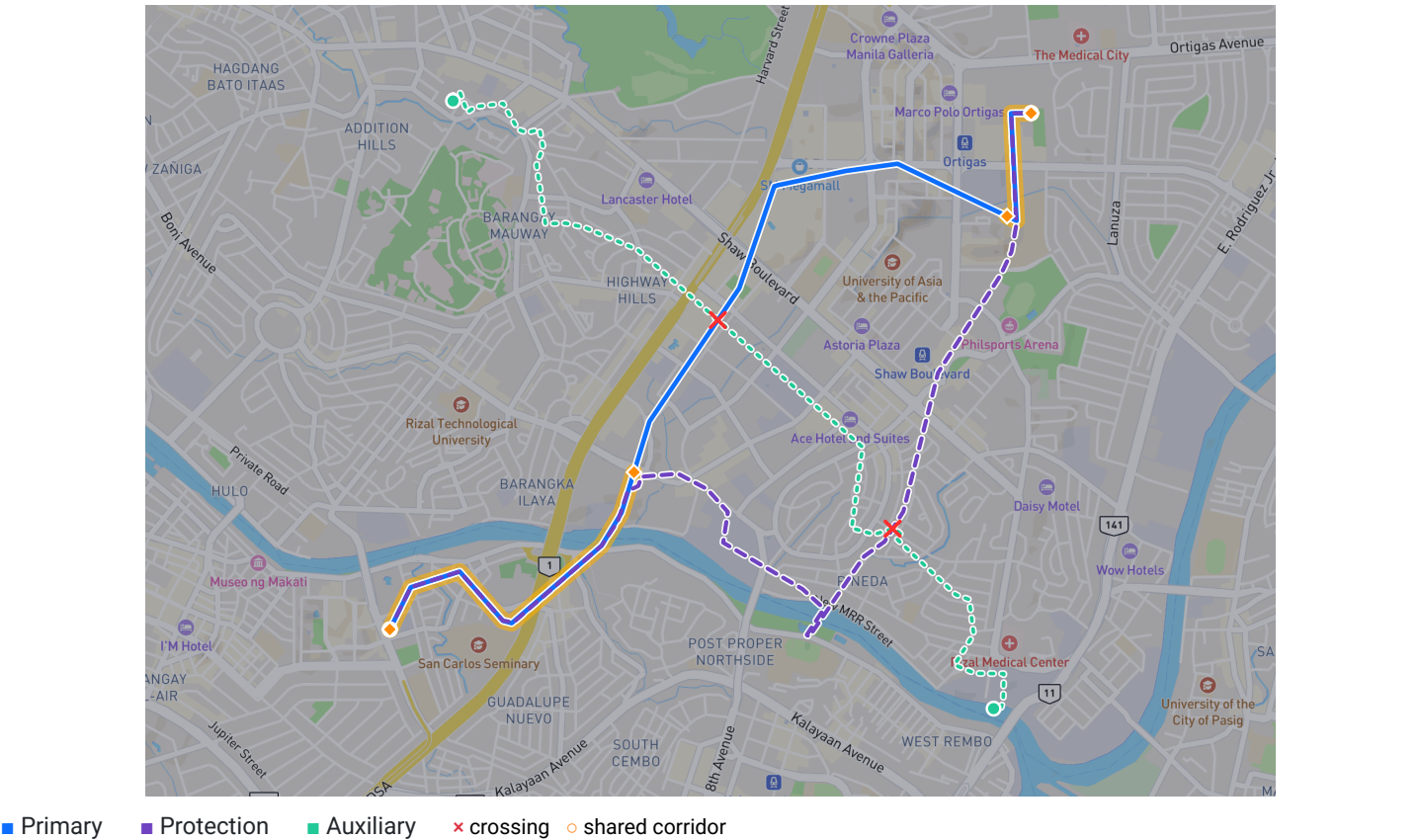
Receiver overload: Protection — the received power sits above the receiver’s overload threshold, so the FAIL is from too much signal (note the positive headroom), not too little. Add inline attenuation, or use a lower-power / correct-reach optic.

Notes / Scope

Demonstration project assembled from the built-in demo data. All values are fictitious, for sample-report purposes only.

Worst-case estimate; verify against vendor datasheets and as-built records.

All 3 paths of this protected circuit shown together. Diverse routes should share as little physical geography as possible.



4 shared-geography risks detected. The paths below share physical geography (within 100 m), so a single incident there can affect more than one path — the protection is not fully diverse at these locations.

Type	Paths	Severity	Extent	Approx. location
Shared corridor	Primary & Protection	High	~3556 m parallel	14.55468, 121.02445
Shared corridor	Primary & Protection	Medium	~1319 m parallel	14.59013, 121.07918
Crossing	Primary & Auxiliary	Medium	point intersection	14.58122, 121.05353
Crossing	Protection & Auxiliary	Medium	point intersection	14.56332, 121.06902

Mitigation: reroute one path to remove the shared section, or record an accepted-risk note with the reason (e.g. no alternative duct available) for the design sign-off.

How this is assessed. Every pair of paths is compared geometrically. A **shared corridor** is a stretch where two routes run within the configured 100 m proximity threshold — close enough that a single incident there (a backhoe strike, fire, flood or duct collapse) can sever both paths at once, defeating the protection. A **crossing** is a point where two routes intersect — a discrete single point of failure. **Severity**: every flagged location is at least Medium (never Low) because one incident there can sever multiple routes — a crossing is Medium (High if a third route meets the same point); a shared corridor is Medium under 2 km, High at 2 km or more. **Diversity Risk Index**: per pair we combine the corridor overlap C (shared length ÷ shorter path) with the crossing risk $X = 1 - (1 - 0.15)^n$ for n crossings, as $1 - (1 - C)(1 - X)$; the headline is the worst (least-diverse) pair. 0 % = fully independent routes; 100 % = a shared failure zone spanning the whole route.

Primary

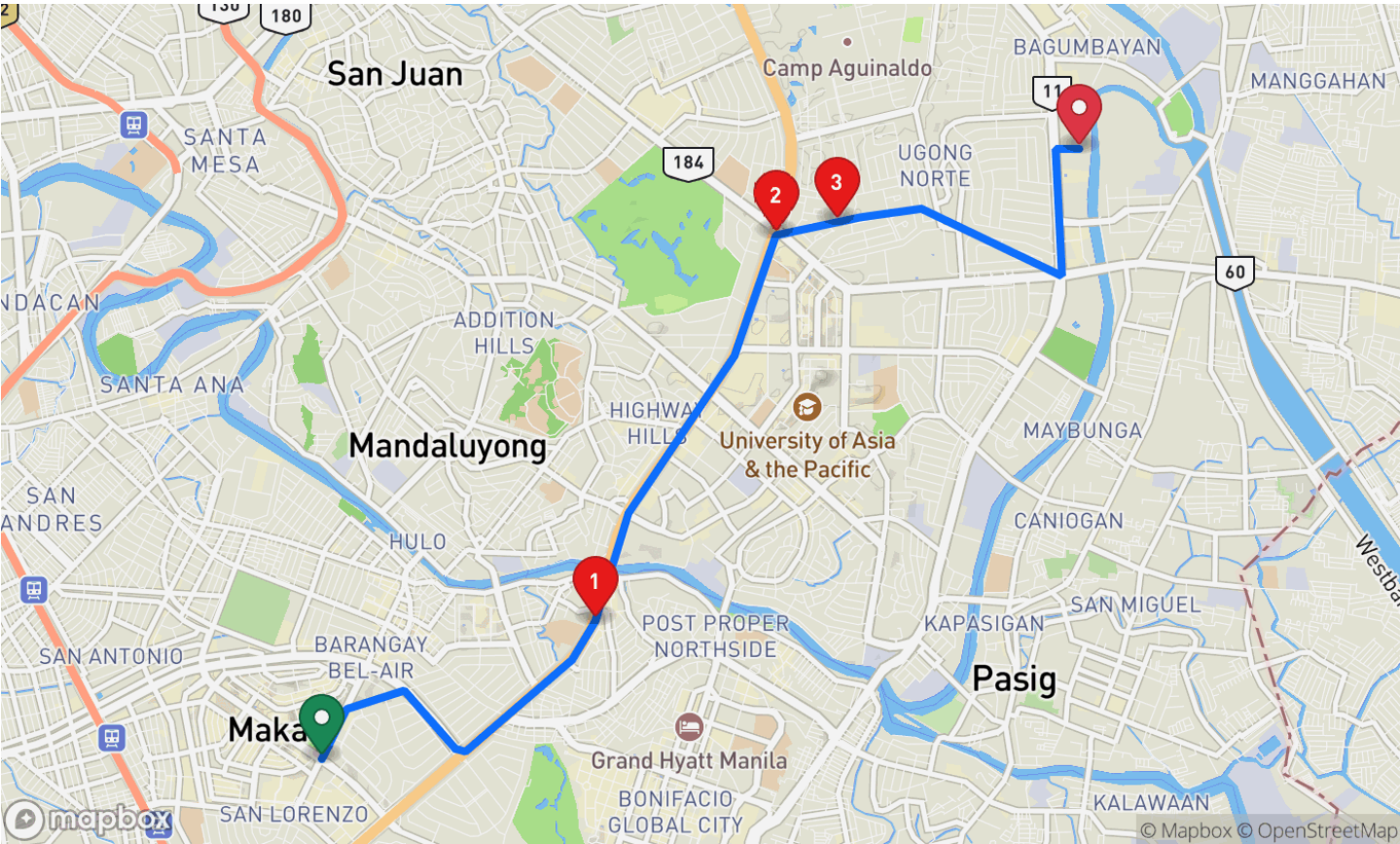
Horizon Tower POP — Bayfront Campus Node

Circuit / Link ID: CIR-2026-DEMO-001

Primary route via the existing duct bank along the main corridor — the working path in normal operation.

10G Link speed	2 Fiber cores duplex	10.37 km Route + Slack		
3.69 dB Link loss (worst-case)	6.41 dB Headroom	GYFTY Entire route · 24 cores		
Verdict PASS worst-case PASS typical				
16 Route waypoints	3 Closures	75 m Route slack	4 Splices	2 Connector pairs

The following pages — route map, technical analysis and as-built measurements — belong to this path.



Illustrative waypoint route (straight segments between points). Mapped distance: 10.30 km, 16 waypoints · Closures: 3 – 1 Dome, 1 Inline/Butt, 1 Aerial/Pole. The Route Distance field is the source of truth (it accounts for slack, maintenance loops and on-prem routing).

Closure Schedule

#	Label	Type	Latitude	Longitude	Slack (m)	Notes
1	CL-1	Dome	14.56469	121.04499	30	–
2	CL-2	Inline/Butt	14.59270	121.05854	25	Handback joint – MetroFiber leased span ends, our build resumes.
3	CL-3	Aerial/Pole	14.59366	121.06313	20	Pole-mounted closure before the campus approach.

Total slack: 0.075 km

Termination Points

	Site A — Horizon Tower POP	Site B — Bayfront Campus Node
Floor Level	12/F	B1
Meet-Me / Data Room	Meet-Me Room 12A	Carrier Room 2
ODF Size	48 ports	96 ports
ODF Designation	ODF 3	ODF 1
Connector Type	SC/APC	SC/APC
Tray Identifier	Tray 7	Tray 2
Rack / Cabinet	Rack R08	Rack C15
Cable ID / Label	FOC-HT-001	FOC-BC-114
Splice Closure / Cassette	Cassette 4	NAP-09
Port Mode	Simplex	Simplex
Port Number(s)	Ports 13–14	Port 41

Cable: GYFTY — All-dielectric (FRP), stranded loose tube, PE sheath (duct; safe near power) · 24 fibers

Transceiver

10G, SFP+, LC

Wavelength: 1550 nm

Reach: 40 km (G.652.D)

Optical spec: TX -1.00 to 2.00 dBm · RX sensitivity -14.10 dBm · overload -1.00 dBm — the basis for the Power Margin Verdict

Datasheet: <https://img-en.fs.com/file/datasheet/10g-er-1550.pdf>

Notes: ER commercial. PAVE -1/+2; OMA sensitivity -14.1 (no avg sens published); overload -1; LMAX 40km; 1.5W; 0-70C.

Link-Loss Breakdown

Parameter	Value
Fiber type	Singlemode 9/125 μm
Route + Slack	10.30 + 0.07 = 10.37 km
Attenuation (dB/km) (auto)	0.25
Fiber loss (dB)	2.59 (70%)
Connector loss (2 pairs × 0.20 dB)	0.40 (11%)
Splice loss (4 × 0.10 dB, 3 closures drawn)	0.40 (11%)
Additional loss (dB)	0.00
Measurement uncertainty (dB)	0.30 (8%)
Worst-case total (dB)	3.69

Power Waterfall

1550 nm

Step	Worst-case	Typical
Transmit power	-1.00 dBm	0.50 dBm
- Fiber loss (2.59 dB)	-3.59 dBm	-2.09 dBm
- Connector loss (0.40 dB)	-3.99 dBm	-2.49 dBm
- Splice loss (0.40 dB)	-4.39 dBm	-2.89 dBm
- Additional loss (0.00 dB)	-4.39 dBm	-2.89 dBm
- Measurement uncertainty (0.30 dB)	-4.69 dBm	-3.19 dBm
= Received power	-4.69 dBm	-3.19 dBm
Receiver sensitivity	-14.10 dBm	-14.10 dBm
= Above sensitivity	9.41 dB	10.91 dB
- System margin reserved	3.00 dB	3.00 dB
= Headroom	6.41 dB	7.91 dB

Power Margin Verdict

1550 nm

Basis	TX (dBm)	Power Budget (dB)	Link Loss (dB)	System Margin (dB)	Headroom (dB)	Rx Power (dBm)	Verdict
Worst-case	-1.00	13.10	3.69	3.00	6.41	-4.69	PASS
Typical	0.50	14.60	3.69	3.00	7.91	-3.19	PASS

Rx window (sensitivity...overload): -14.10...-1.00 dBm
Expected Rx power (TX min - worst-case loss ... TX max - minimum loss): -4.69...-1.19 dBm

Protection

Horizon Tower POP — Bayfront Campus Node

Circuit / Link ID: CIR-2026-DEMO-002

Diverse protection route via the coastal conduit — physically separated from the primary for resilience.

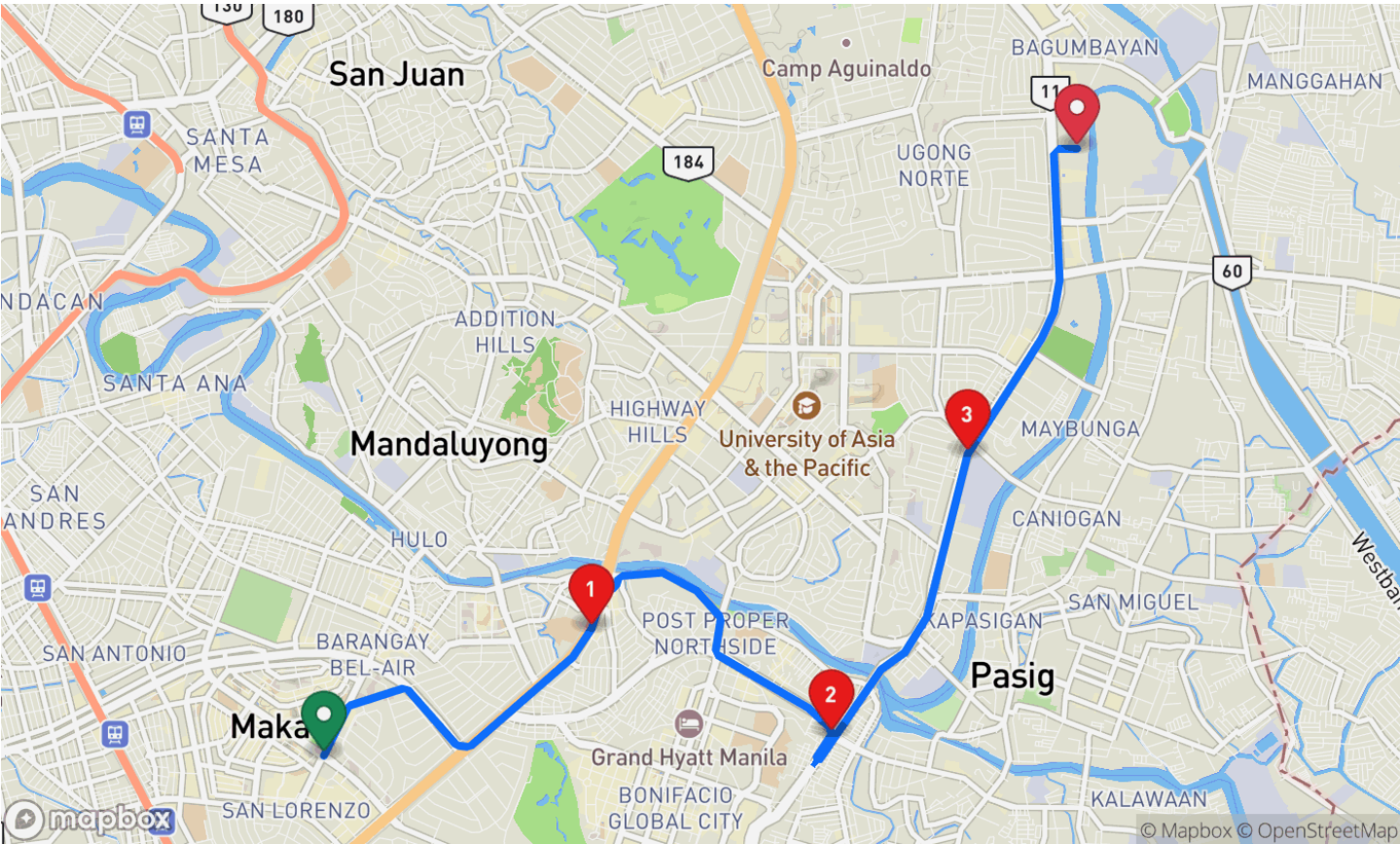
10G Link speed	1 Fiber core simplex	12.11 km Route + Slack
6.14 dB Link loss (worst-case)	14.86 dB Headroom	GYXTC8Y Last mile · 12 cores 3-segment schedule

Verdict	
FAIL worst-case	FAIL typical
RECEIVER OVERLOAD — Rx too high	

28 Route waypoints	3 Closures	75 m Route slack	6 Splices	2 Connector pairs
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Per wavelength			
1270 nm		1330 nm	
FAIL	—	FAIL	—
OVERLOAD		OVERLOAD	

The following pages — route map, technical analysis and as-built measurements — belong to this path.



Illustrative waypoint route (straight segments between points). Mapped distance: 12.03 km, 28 waypoints · Closures: 3 — 1 Dome, 1 Vault, 1 Aerial/Pole. The Route Distance field is the source of truth (it accounts for slack, maintenance loops and on-prem routing).

Closure Schedule

#	Label	Type	Latitude	Longitude	Slack (m)	Notes
1	CL-P1	Dome	14.56395	121.04466	25	Drum joint at the Ortigas duct entry.
2	CL-P2	Vault	14.55623	121.06278	30	Vault under the flyover — confined space entry permit required.
3	CL-P3	Aerial/Pole	14.57669	121.07305	20	Aerial closure where the ADSS span lands back on our build.

Total slack: 0.075 km

Termination Points

	Site A — Horizon Tower POP	Site B — Bayfront Campus Node
Floor Level	12/F	B1
ODF Size	48 ports	96 ports
Tray Identifier	Tray 9	Tray 4
Port Mode	Duplex	Duplex
Port Number(s)	Ports 15–16	Port 42

Cable Schedule

Role	Cable Type	Length	Cores	Note
Backhaul	GYTA — Stranded loose tube, APL (aluminium) moisture barrier, PE sheath (duct)	6 km	24	
Intermediate span	GYFTY — All-dielectric (FRP), stranded loose tube, PE sheath (duct; safe near power)	4 km	24	
Last mile	GYXTC8Y — Central tube, figure-8 self-supporting, integral steel messenger, PE sheath	2 km	12	

Transceiver

10G, SFP+, LC

Wavelength: 1270 nm

Reach: 80 km (G.652.D)

Optical spec: TX 1.00 to 5.00 dBm · RX sensitivity -23.00 dBm · overload -7.00 dBm — the basis for the Power Margin Verdict

Datasheet: <https://img-en.fs.com/file/datasheet/bidi-sfp-plus-1270tx1330rx-80km-transceiver-datasheet.pdf>

Notes: 10GBASE-BX BiDi single strand, 80km. Pairs with 1330TX/1270RX.

Paired with: fs-10g-bx80-1330tx-1270rx

Link-Loss Breakdown

Parameter	1270 nm	1330 nm
Fiber type	Singlemode 9/125 μm	
Route + Slack	12.03 + 0.07 = 12.11 km	
Attenuation (dB/km) (auto)	0.40	0.40
Fiber loss (dB)	4.84 (79%)	4.84 (79%)
Connector loss (2 pairs × 0.20 dB)	0.40 (7%)	0.40 (7%)
Splice loss (6 × 0.10 dB, 3 closures drawn)	0.60 (10%)	0.60 (10%)
Additional loss (dB)	0.00	0.00
Measurement uncertainty (dB)	0.30 (5%)	0.30 (5%)
Worst-case total (dB)	6.14	6.14

Power Waterfall

1270 nm

Step	Worst-case	Typical
Transmit power	1.00 dBm	3.00 dBm
- Fiber loss (4.84 dB)	-3.84 dBm	-1.84 dBm
- Connector loss (0.40 dB)	-4.24 dBm	-2.24 dBm
- Splice loss (0.60 dB)	-4.84 dBm	-2.84 dBm
- Additional loss (0.00 dB)	-4.84 dBm	-2.84 dBm
- Measurement uncertainty (0.30 dB)	-5.14 dBm	-3.14 dBm
= Received power	-5.14 dBm	-3.14 dBm
Receiver sensitivity	-23.00 dBm	-23.00 dBm
= Above sensitivity	17.86 dB	19.86 dB
- System margin reserved	3.00 dB	3.00 dB
= Headroom	14.86 dB	16.86 dB

1330 nm

Step	Worst-case	Typical
Transmit power	1.00 dBm	3.00 dBm
- Fiber loss (4.84 dB)	-3.84 dBm	-1.84 dBm
- Connector loss (0.40 dB)	-4.24 dBm	-2.24 dBm
- Splice loss (0.60 dB)	-4.84 dBm	-2.84 dBm
- Additional loss (0.00 dB)	-4.84 dBm	-2.84 dBm
- Measurement uncertainty (0.30 dB)	-5.14 dBm	-3.14 dBm
= Received power	-5.14 dBm	-3.14 dBm
Receiver sensitivity	-23.00 dBm	-23.00 dBm
= Above sensitivity	17.86 dB	19.86 dB
- System margin reserved	3.00 dB	3.00 dB
= Headroom	14.86 dB	16.86 dB

Power Margin Verdict

1270 nm

Basis	TX (dBm)	Power Budget (dB)	Link Loss (dB)	System Margin (dB)	Headroom (dB)	Rx Power (dBm)	Verdict
Worst-case	1.00	24.00	6.14	3.00	14.86	-5.14	FAIL OVERLOAD
Typical	3.00	26.00	6.14	3.00	16.86	-3.14	FAIL OVERLOAD

Rx window (sensitivity...overload): -23.00...-7.00 dBm
Expected Rx power (TX min - worst-case loss ... TX max - minimum loss): -5.14...-0.59 dBm

1330 nm

Basis	TX (dBm)	Power Budget (dB)	Link Loss (dB)	System Margin (dB)	Headroom (dB)	Rx Power (dBm)	Verdict
Worst-case	1.00	24.00	6.14	3.00	14.86	-5.14	FAIL OVERLOAD
Typical	3.00	26.00	6.14	3.00	16.86	-3.14	FAIL OVERLOAD

Rx window (sensitivity...overload): -23.00...-7.00 dBm
Expected Rx power (TX min - worst-case loss ... TX max - minimum loss): -5.14...-0.59 dBm

Auxiliary

Horizon Tower POP — Bayfront Campus Node

Circuit / Link ID: CIR-2026-DEMO-003

Auxiliary cross-town link (Eastgate — Riverside). Not part of the protected circuit; shown because it crosses the primary and protection routes.

10G Link speed	1 Fiber core simplex	9.81 km Route + Slack
8.02 dB Link loss (worst-case)	-4.82 dB Headroom	GYXTC8Y Last mile · 12 cores 2-segment schedule

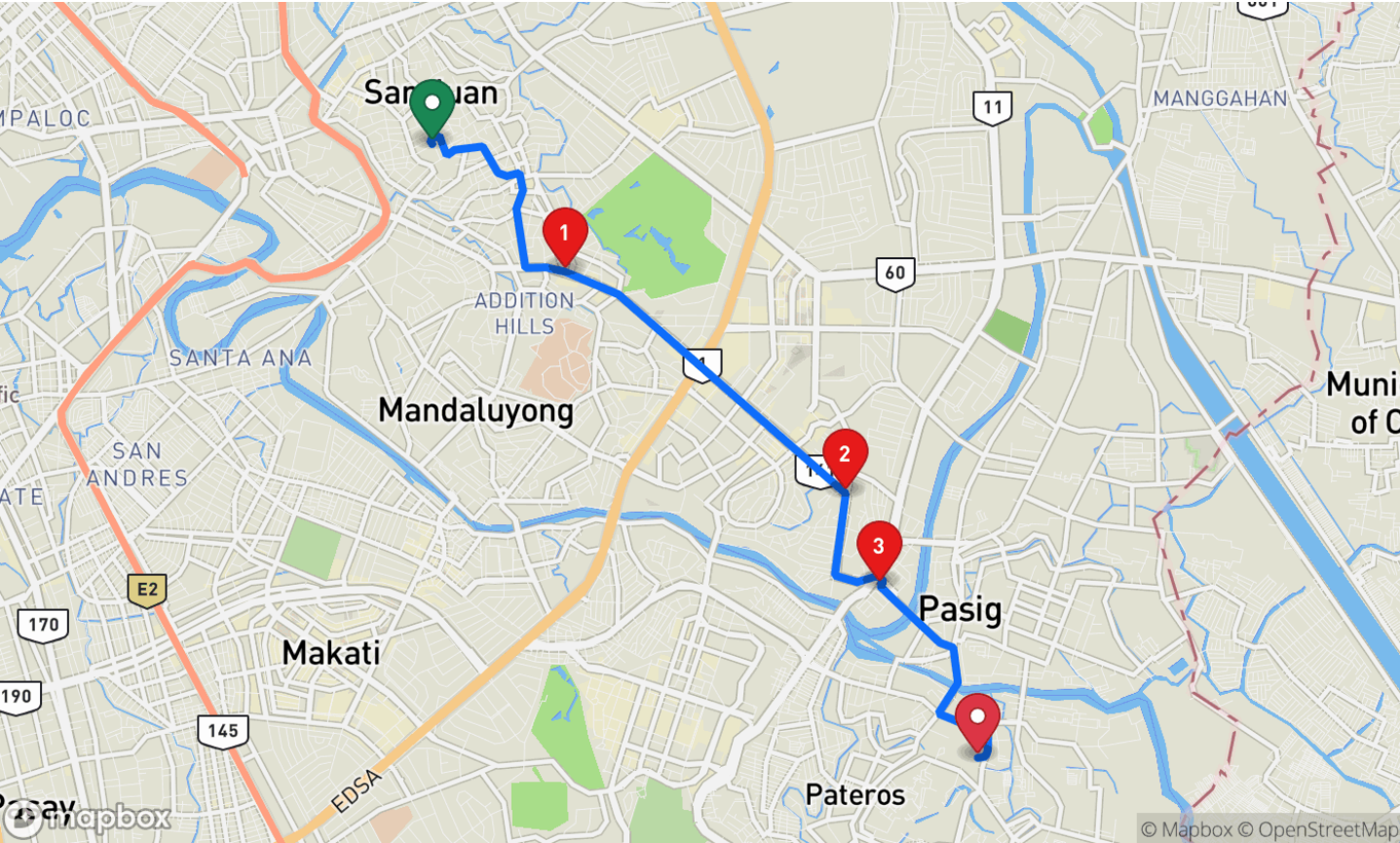
Verdict	
FAIL	WARN
worst-case	typical

31 Route waypoints	3 Closures	75 m Route slack	4 Splices	2 Connector pairs
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Per wavelength

1270 nm	1330 nm
FAIL —	FAIL —

The following pages — route map, technical analysis and as-built measurements — belong to this path.



Illustrative waypoint route (straight segments between points). Mapped distance: 9.73 km, 31 waypoints · Closures: 3 — 1 Dome, 1 Inline/Butt, 1 Pedestal. The Route Distance field is the source of truth (it accounts for slack, maintenance loops and on-prem routing).

Closure Schedule

#	Label	Type	Latitude	Longitude	Slack (m)	Notes
1	CL-X1	Dome	14.58916	121.04174	25	Drum joint north of the river crossing.
2	CL-X2	Inline/Butt	14.57033	121.06637	20	Mid-span repair joint from the 2024 cable strike.
3	CL-X3	Pedestal	14.56250	121.06935	30	Pedestal at the campus boundary.

Total slack: 0.075 km

Termination Points

	Site A — Eastgate Data Hub	Site B — Riverside Access Node
Port Mode	Simplex	Simplex

Cable Schedule

Role	Cable Type	Length	Cores	Note
Backhaul	ADSS — All-dielectric self-supporting (no messenger; aramid; safe near HV)	7 km	24	
Last mile	GYXTC8Y — Central tube, figure-8 self-supporting, integral steel messenger, PE sheath	3 km	12	

Transceiver

10G, SFP+, LC
Wavelength: 1270 nm
Reach: 10 km (G.652.D)
Optical spec: TX -8.20 to 0.50 dBm · RX sensitivity -14.40 dBm · overload 0.50 dBm — the basis for the Power Margin Verdict
Datasheet: <https://img-en.fs.com/file/datasheet/bidi-sfp-plus-1270tx1330rx-10km-transceiver-datasheet.pdf>
Notes: 10GBASE-BX BiDi single strand, 10km. Pairs with 1330TX/1270RX.
Paired with: fs-10g-bx10-1330tx-1270rx

Link-Loss Breakdown

Parameter	1270 nm	1330 nm
Fiber type	Singlemode 9/125 μm	
Route + Slack	9.73 + 0.07 = 9.81 km	
Attenuation (dB/km) (auto)	0.40	0.40
Fiber loss (dB)	3.92 (49%)	3.92 (49%)
Connector loss (2 pairs × 0.20 dB)	0.40 (5%)	0.40 (5%)
Splice loss (4 × 0.10 dB, 3 closures drawn)	0.40 (5%)	0.40 (5%)
Additional loss (dB)	3.00 (37%)	3.00 (37%)
Measurement uncertainty (dB)	0.30 (4%)	0.30 (4%)
Worst-case total (dB)	8.02	8.02

Power Waterfall

1270 nm

Step	Worst-case	Typical
Transmit power	-8.20 dBm	-3.85 dBm
- Fiber loss (3.92 dB)	-12.12 dBm	-7.77 dBm
- Connector loss (0.40 dB)	-12.52 dBm	-8.17 dBm
- Splice loss (0.40 dB)	-12.92 dBm	-8.57 dBm
- Additional loss (3.00 dB)	-15.92 dBm	-11.57 dBm
- Measurement uncertainty (0.30 dB)	-16.22 dBm	-11.87 dBm
= Received power	-16.22 dBm	-11.87 dBm
Receiver sensitivity	-14.40 dBm	-14.40 dBm
= Above sensitivity	-1.82 dB	2.53 dB
- System margin reserved	3.00 dB	3.00 dB
= Headroom	-4.82 dB	-0.47 dB

1330 nm

Step	Worst-case	Typical
Transmit power	-8.20 dBm	-3.85 dBm
- Fiber loss (3.92 dB)	-12.12 dBm	-7.77 dBm
- Connector loss (0.40 dB)	-12.52 dBm	-8.17 dBm
- Splice loss (0.40 dB)	-12.92 dBm	-8.57 dBm
- Additional loss (3.00 dB)	-15.92 dBm	-11.57 dBm
- Measurement uncertainty (0.30 dB)	-16.22 dBm	-11.87 dBm
= Received power	-16.22 dBm	-11.87 dBm
Receiver sensitivity	-14.40 dBm	-14.40 dBm
= Above sensitivity	-1.82 dB	2.53 dB
- System margin reserved	3.00 dB	3.00 dB
= Headroom	-4.82 dB	-0.47 dB

Power Margin Verdict

1270 nm

Basis	TX (dBm)	Power Budget (dB)	Link Loss (dB)	System Margin (dB)	Headroom (dB)	Rx Power (dBm)	Verdict
Worst-case	-8.20	6.20	8.02	3.00	-4.82	-16.22	FAIL
Typical	-3.85	10.55	8.02	3.00	-0.47	-11.87	WARN

Rx window (sensitivity...overload): -14.40...0.50 dBm

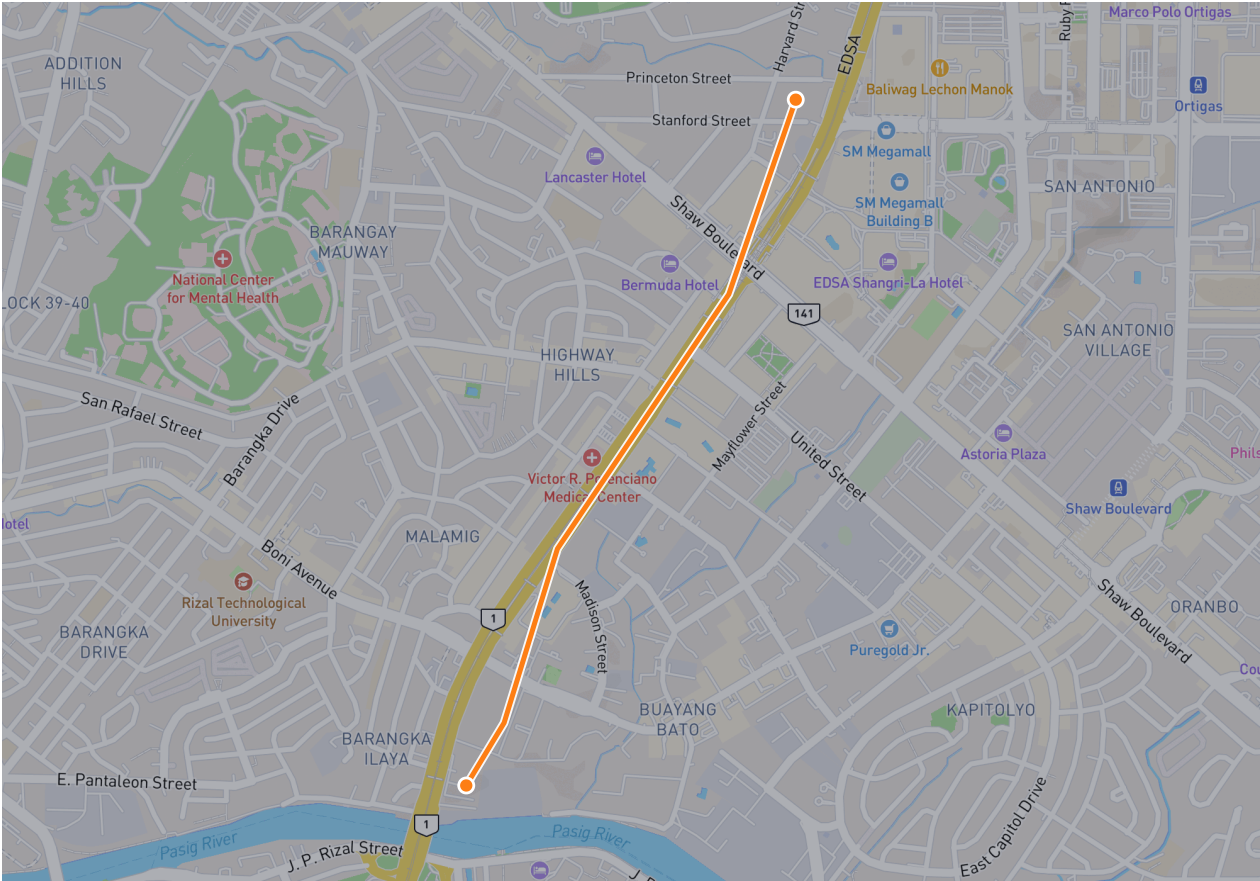
Expected Rx power (TX min - worst-case loss ... TX max - minimum loss): -16.22...-7.02 dBm

1330 nm

Basis	TX (dBm)	Power Budget (dB)	Link Loss (dB)	System Margin (dB)	Headroom (dB)	Rx Power (dBm)	Verdict
Worst-case	-8.20	6.20	8.02	3.00	-4.82	-16.22	FAIL
Typical	-3.85	10.55	8.02	3.00	-0.47	-11.87	WARN

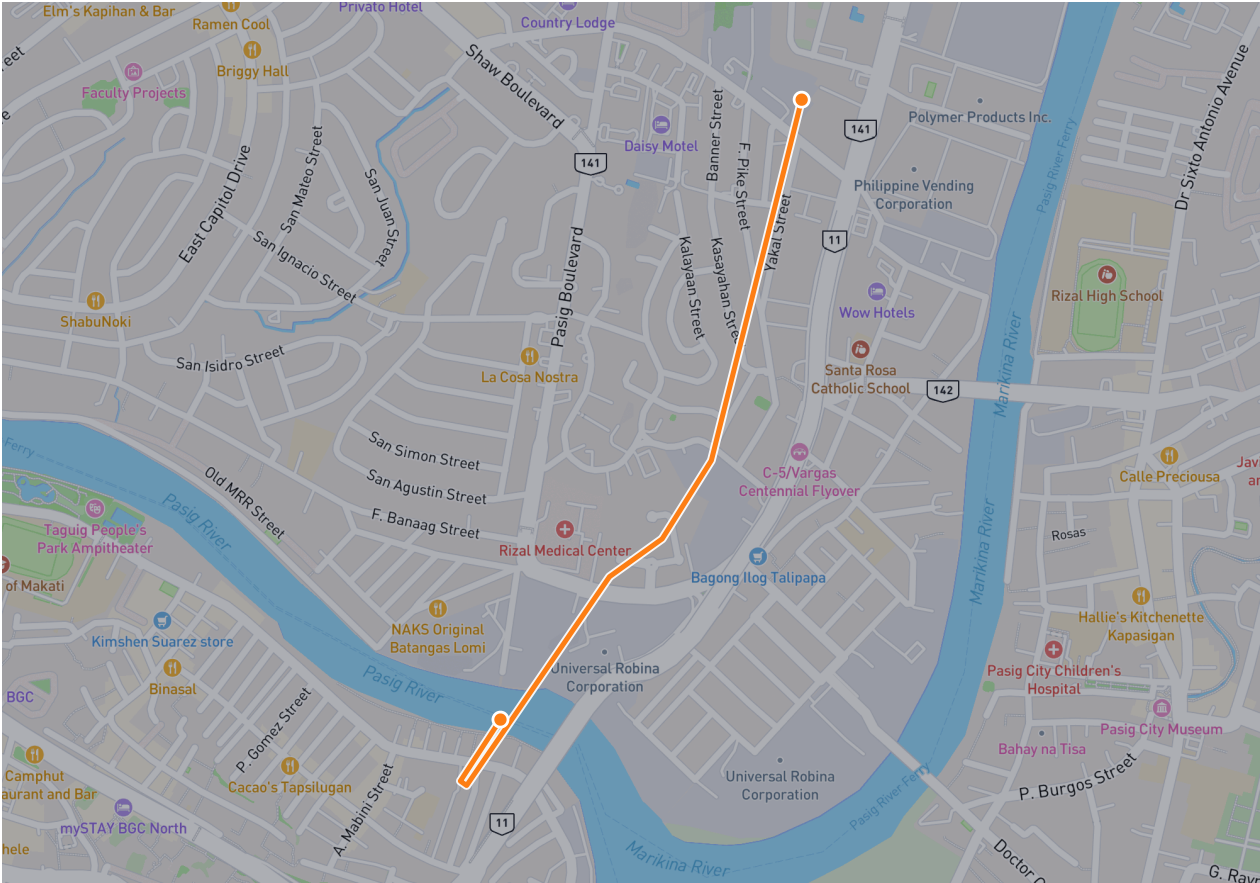
Rx window (sensitivity...overload): -14.40...0.50 dBm

Expected Rx power (TX min - worst-case loss ... TX max - minimum loss): -16.22...-7.02 dBm



Ownership	Third-party lease
Owner / carrier	MetroFiber Holdings Inc.
Cable	GYTA53 — Stranded loose tube, corrugated steel-tape armor, double PE (direct burial)
Cores	FOC24
Installed	04-2016
Length	3.84 km
Route waypoints	6 – 10
Notes	IRU on 2 dark cores, Ortigas duct bank. Maintenance window Sun 0100-0500; escalation via their NOC.

This stretch is not part of the build: it runs on fiber owned by the party named above, so its repair times, access arrangements and commercial terms are theirs rather than ours.



Ownership	Carrier-owned
Owner / carrier	Luzon Backbone Corporation
Cable	ADSS – All-dielectric self-supporting (no messenger; aramid; safe near HV)
Cores	FOC48
Installed	11-2019
Length	3.17 km
Route waypoints	17 – 23
Notes	Aerial ADSS on NGCP transmission poles. Shared with the utility's own SCADA fibers.

This stretch is not part of the build: it runs on fiber owned by the party named above, so its repair times, access arrangements and commercial terms are theirs rather than ours.

Survey record supporting this design: the sites it terminates on, points of interest recorded on the route, stretches of route owned by others, and distances measured on the map. Measurements are indicative and taken from mapped geometry.

Sites (4)

Ref	Site	Address	Owner	Coordinates
SITE-1	Horizon Tower POP	88 Lightwave Avenue, Makati City	Horizon Fiber Networks Inc.	14.55468, 121.02445
SITE-2	Bayfront Campus Node	1 Esplanade Drive, Pasay City	Skyline Data Centers Corp.	14.59898, 121.08131
SITE-3	Eastgate Data Hub	12 Ortigas Avenue, Pasig City	Metro Interconnect Corp.	14.60002, 121.03005
SITE-4	Riverside Access Node	5 Riverbank Road, Mandaluyong City	Metro Interconnect Corp.	14.54788, 121.07798

Points of interest (3)

Ref	Point of interest	Type	Coordinates	Notes
POI-1	Existing 3rd-party NAP	Fiber asset	14.55742, 121.03344	NAP/FAT — Reference only — not on the fiber route.
POI-2	Planned handhole (survey)	Fiber asset	14.58146, 121.05703	Vault — Reference only — not on the fiber route.
POI-3	Manhole (as-built ref)	Fiber asset	14.59068, 121.06618	Pedestal — Reference only — not on the fiber route.

Third-party spans (2)

Path	Ref	Ownership	Owner / carrier	Cable	Cores	Installed	Length	Notes
Primary	S1	Third-party lease	MetroFiber Holdings Inc.	GYTA53 — Stranded loose tube, corrugated steel-tape armor, double PE (direct burial)	24	04-2016	3.84 km	IRU on 2 dark cores, Ortigas duct bank. Maintenance window Sun 0100-0500; escalation via their NOC.
Protection	S1	Carrier-owned	Luzon Backbone Corporation	ADSS — All-dielectric self-supporting (no messenger; aramid; safe near HV)	48	11-2019	3.17 km	Aerial ADSS on NGCP transmission poles. Shared with the utility's own SCADA fibers.

Measurements (3)

Path	Ref	Distance	Points	From	To	Note
Primary	M1	0.045 km	2	14.56188, 121.04323	14.56228, 121.04323	Shaw Boulevard crossing — trenchless bore, no open cut permitted.
Primary	M2	0.088 km	3	14.55468, 121.02445	14.55510, 121.02483	Riser from the street handhole to the MDF room, Horizon Tower.
Auxiliary	M1	0.060 km	2	14.57033, 121.06637	14.57033, 121.06692	Clearance from the pole line to the NGCP transmission tower base.

TX Power Bases

Each row in the Power Margin Verdict table uses one of three TX power assumptions:

- Worst-case** — The datasheet minimum launch power; represents the end-of-life floor of a degraded laser at maximum temperature. Using this basis gives the most conservative (pessimistic) prediction and is the required basis for a link to achieve a formal PASS. If a link closes on worst-case, it will close under all expected field conditions.
- Typical** — The midpoint of the datasheet min/max window. A transceiver’s automatic power control (APC) loop trims the laser bias current continuously to hold the average output near this point, compensating for temperature swings and long-term laser fade. Most healthy, in-service links operate at or near the typical basis.
- As-built (field-measured)** — Not computed here; use the measured TX power from an optical power meter at the transmit patch panel after installation. Substitute this into the TX field to verify the actual commissioned link margin.

Table Columns

- TX (dBm)** — Launch power assumption for that row (see TX Bases above).
- Power Budget (dB)** — TX power minus RX sensitivity; the gross optical margin available before link loss is considered.
- Link Loss (dB)** — Worst-case total span loss including fiber attenuation, connector insertion loss, splice loss, any additional fixed losses (splitters, attenuators), and a measurement uncertainty adder per FOA guidelines.
- System Margin (dB)** — An engineering reserve (typically 3 dB) deducted from the budget to allow for aging, repair splices, component degradation, and environmental factors not modelled explicitly.
- Headroom (dB)** — Budget – Link Loss – System Margin. Positive = link closes with margin to spare; negative = the link closes but the reserved system margin is not met (WARN); the link fails only when Budget – Link Loss is negative or the receiver would overload.
- Rx Power (dBm)** — Expected received optical power = TX – Link Loss. This must sit inside the receiver’s operating window (sensitivity to overload) for reliable operation. Overload is checked at maximum TX and minimum plausible loss (typical component values, no measurement-uncertainty adder) — the highest Rx power that can actually arrive. The color coding below applies to this cell.

Rx Power Cell Color Coding

- Green** Row verdict is PASS: the link closes with positive headroom after the full system margin.
- Amber** Row verdict is WARN: the link closes but the headroom is less than the configured system margin.
- Red** Row verdict is FAIL: the link does not close on this basis, or the receiver is in overload.

Verdict Model

- PASS** The link closes on the worst-case TX basis with positive headroom after deducting the full system margin. Suitable for sign-off documentation.
- WARN** The link closes (Rx power is above sensitivity) but the headroom is less than the configured system margin. The link is usable but has reduced design reserve; consider reducing loss, increasing TX power, or improving receiver sensitivity.
- FAIL** The link does not close on the worst-case basis (Rx power below sensitivity), or the receiver is in overload. Corrective action required before commissioning.

TX Power & APC Note

Modern SFP/SFP+/XFP/QSFP transceivers incorporate an internal automatic power control (APC) feedback loop that monitors the rear-facet photodiode of the laser and continuously adjusts the bias current to maintain a near-constant average output power. This means the module holds its output close to the datasheet midpoint (the Typical basis used in this report) across the full operating temperature range and throughout its service life. The datasheet minimum TX power is the worst-case end-of-life floor — the lowest output the APC can sustain once the laser has degraded to its threshold current ceiling. Designing to this minimum ensures the link will close even on its last day of warranted service.

Outdoor fiber cables are commonly labelled with an alphanumeric code (GB/T 7424 / IEC 60794), read left-to-right by position; trailing digits describe armor and outer jacket. Conventions vary slightly by manufacturer.

Code positions

Position	
Classification	<u>GY</u> = outdoor (duct/aerial/buried); <u>GJ</u> = indoor.
Strength member	<u>F</u> = non-metallic (FRP), i.e. all-dielectric; (blank) = metallic.
Structure	<u>T</u> = loose tube (gel-filled); <u>X</u> = central loose tube; <u>S</u> = stranded; <u>D</u> = ribbon (high fiber-count ribbon stack); <u>B</u> = bow-type/flat drop; <u>C8</u> / <u>8</u> = figure-8 self-supporting (integral steel messenger); (<u>J</u>) = tight-buffered (indoor).
Sheath / moisture barrier	<u>A</u> = aluminium-PE laminate (APL); <u>S</u> = steel-PE laminate (PSP); <u>Y</u> = polyethylene (PE); <u>W</u> = twin parallel steel wires + APL (mini); <u>V</u> = PVC.
Armor digit	<u>0</u> none; <u>2</u> steel tape; <u>3</u> single round steel-wire armor; <u>33</u> = double round steel-wire armor (heavy / rodent / direct burial); <u>5</u> corrugated steel tape.
Outer jacket digit	<u>2</u> PE; <u>3</u> PE + nylon.

Common types

Type	Meaning & typical use
<u>GYTA</u>	Loose tube with APL (aluminium) moisture barrier and PE sheath – general duct / underground.
<u>GYTS</u>	Loose tube with steel (PSP) laminate sheath – duct / underground where a steel barrier is preferred.
<u>GYTA53</u>	Loose tube, corrugated steel-tape armor with double PE jacket – direct burial.
<u>GYFTY</u>	All-dielectric (FRP strength member), loose tube, PE sheath – metal-free duct/aerial near power.
<u>GYXTW</u>	Central loose tube with twin parallel steel wires + APL, PE sheath – compact "mini" duct/aerial.
<u>ADSS</u>	All-dielectric self-supporting aerial cable – spans between poles with NO separate messenger (aramid strength members), safe near HV.
<u>OPGW</u>	Optical ground wire – fiber inside the HV earth/ground wire on transmission lines; structural.
<u>GYXTC8Y</u>	Central-tube figure-8 self-supporting cable WITH an integral steel messenger, PE sheath – aerial spans.
<u>GYTC8S</u>	Stranded loose-tube figure-8 self-supporting cable WITH an integral steel messenger – aerial.
<u>GYTA33</u>	Loose tube, double round steel-wire armor, PE sheath – heavy-duty direct burial and rodent-prone routes.
<u>GYDTA (ribbon)</u>	Ribbon loose-tube cable with APL moisture barrier – high fiber-count backbone (mass-fusion spliceable).
<u>GYXTC8S (mini figure-8)</u>	Central-tube figure-8 self-supporting cable WITH an integral steel messenger – short aerial spans, small fiber count.
<u>GJYXCH</u>	Bow-type self-supporting FTTH drop with an integral steel messenger – aerial subscriber drop (G.657).
<u>G.657 flat drop</u>	Bend-insensitive FTTH subscriber drop (e.g. G.657.A1) – last-mile drop to the premises.
<u>Submarine / water-crossing</u>	Armored cable designed for river, lake, or sea crossings – heavy armor, waterproof construction.

ITU fiber bend grades

Grade	Characteristic
<u>G.652.D</u>	Standard SMF (backbone, low water peak).
<u>G.657.A1</u>	≈10 mm minimum bend radius, G.652-compatible drop.
<u>G.657.A2</u>	≈7.5 mm minimum bend radius.
<u>G.657.B3</u>	≈5 mm minimum bend radius, indoor tight bends.

Trailing fiber/core-count suffix

A trailing **-NN<grade>** suffix encodes fiber count and ITU fiber grade – e.g. GYXTC8Y-12G652D = 12 cores of G.652.D fiber. GYXTC8Y decodes as: GY outdoor PE, X central loose tube, T loose/gel-filled, C8 figure-8 self-supporting messenger, Y PE outer sheath.

Designation conventions vary by manufacturer; confirm against the cable datasheet.