CONSUMER PROTECTION ASSOCIATION

HIMMATNAGAR

DIST. : SABARKANTHA

GUJARAT

Comments on

Review of Tariff for Domestic Leased Circuits (DLCs)

Executive Summary :

1. Context and Consumer Perspective :

First of all we are thankful to TRAI for giving us an opportunity to represent the Consumers who are the end users. The Telecom Regulatory Authority of India (TRAI), through its Consultation Paper dated 23.01.2026 , has initiated a comprehensive review of the ceiling tariff framework for Domestic Leased Circuits (DLCs). The review recognizes technological evolution (SD-WAN, DWDM, Ethernet over Fibre), increasing enterprise demand, and the likely entry of ISPs into DLC provisioning.

From a consumer standpoint, DLCs are not merely enterprise products—they are **critical wholesale inputs** that shape the affordability, reliability, and expansion of broadband services across India, particularly in Tier-2, Tier-3, and rural areas.

Our comments (Q1–Q9) consistently emphasize a **consumer-first, competition-enhancing, transparency-driven regulatory framework**.

2. Key Consumer Benefits of Tariff Reform

(A) Lower Retail Broadband Prices Through Wholesale Cost Pass-Through

- DLC tariffs significantly influence bandwidth and transmission costs for ISP-B and ISP-C operators.
- Rational, cost-oriented, and transparent DLC tariffs reduce wholesale OPEX.
- In competitive markets, this can translate into:
    - Lower retail broadband tariffs
    - Better plan quality (higher speeds, fewer congestion issues)
    - Expansion of services in smaller towns

(B) Improved Service Quality via SLA-Linked Pricing

Linking tariffs with measurable service commitments (uptime, MTTR, latency, packet loss) ensures:

- Consumers do not pay premium rates for sub-standard service.
- Enterprises and SMEs receive predictable performance.
- Downstream consumer-facing services (e-commerce, telemedicine, digital payments) operate more reliably.

(C) Enhanced Competition and SME Inclusion

Allowing ISPs to provide DLCs can:

- Increase contestability in metro and semi-urban routes.
- Enable innovation (SD-WAN, managed services).
- Support SME digitalization beyond large urban enterprises.

(D) Regional Equity

Region-sensitive and transparent tariff structures can:

- Address structural disadvantages in remote and hilly regions.
- Prevent excessive local-lead and ancillary charges.
- Promote equitable digital development.

3. Major Consumer Concerns Identified

(1) Opaque Pricing and Hidden Charges

- Local lead charges, cross-connect fees, special construction costs, and “add-ons” often distort the effective tariff.
- Lack of standardized disclosure weakens comparability and undermines competition.

(2) Discriminatory Pricing and Margin Squeeze

- Large integrated operators may offer selective discounts to large enterprises.
- Smaller ISPs (B/C) risk being squeezed via higher wholesale rates.
- This reduces consumer choice and increases market concentration.

(3) Quality Dilution Without SLA Enforcement

- Premium pricing without enforceable SLA metrics risks:
    - Lower uptime

    - Slow restoration
    - Congestion
- Consumers indirectly suffer through service instability.

(4) Tariff Rigidity or Over-Regulation

- Excessively rigid ceilings may:
    - Discourage investment in MPLS cores, DWDM upgrades, 5G backhaul.
    - Slow innovation in SD-WAN/cloud-based services.

(5) Uneven Regional Outcomes

- Metro competition may push tariffs below ceiling.
- Remote regions may continue to face high effective tariffs due to limited infrastructure competition.

4. Balanced Position on MPLS-VPN and Emerging Technologies

We recommend a **calibrated regulatory approach**:

- MPLS-VPN and managed DLC services should not remain entirely outside regulatory oversight.
- However, regulation should focus on:
    - Bottleneck inputs (access, local lead, transmission)
    - Transparency and non-discrimination
    - SLA disclosure and enforceability

Technology-specific rigid ceilings should be avoided. Instead:

- Adopt **technology-neutral but performance-specific regulation**

- Focus on bandwidth tiers + SLA commitments + regional context.

5. Key Recommendations (Consumer-First Safeguards)

1. Cost-Based Tariff Ceilings with Glide Path

- Update ceilings reflecting technological cost reductions.
- Introduce phased recalibration to avoid market shock.

2. Mandatory Transparency & Unbundling

Require publication and itemisation of:

- Base circuit tariff
- Local lead charges
- Installation/OTC
- Port/cross-connect fees
- Upgrade/downgrade charges
- Lock-in/exit terms
- SLA commitments

3. Non-Discrimination & Reference Offers

- Published wholesale reference offers.
- Transparent discount policies.
- Protection for ISP-B/C operators.

4. SLA-Linked Tariff Structure

Standardized service tiers based on:

- Bandwidth assurance

- Uptime (e.g., 99.5%, 99.9%, 99.99%)
- Restoration time (MTTR)
- Latency/packet loss (where committed)
- Redundancy architecture

Premium pricing should only be permitted when objectively tied to stronger commitments.

5. Granular Capacity Framework

- Move beyond legacy capacity buckets.
- Introduce scalable Mbps-to-Gbps continuum aligned with Ethernet/IP-based provisioning.

6. Periodic Review Mechanism

- Mandatory review every 2–3 years.
- Reflect fibre densification, DWDM cost decline, automation gains.

7. Rural & Tier-2/Tier-3 Protections

- Transparency in local lead pricing.
- Benchmark-based regional ranges.
- Alignment with public fibre networks (e.g., BharatNet) to ensure usable wholesale pricing.

6. Overall Consumer-First Conclusion

DLC tariffs function as a **strategic wholesale bottleneck** in India's digital ecosystem.

The review is timely and necessary. However, consumer benefits are not automatic. To ensure that tariff reform translates into:

- Affordable broadband,
- Reliable enterprise connectivity,
- Strong SME digitization,
- Competitive ISP markets, and
- Equitable rural access,

TRAI should adopt a **balanced regulatory model** that combines:

✓ Cost orientation

✓ Transparency and unbundling

✓ Non-discrimination

✓ SLA-linked accountability

✓ Technology neutrality

✓ Periodic recalibration

Such a framework will protect consumers, promote competition, enable innovation, and align DLC regulation with India's digital transformation goals—while ensuring sustainable returns for service providers.

Issues for Consultations

Q1: What is expected to be the likely impact on competition and tariffs in the DLC sector, if the ISPs are permitted to provide DLCs in the future? Please provide your response with justification.

Comments :

Likely impact on competition and tariffs if ISPs are permitted to provide DLCs :

1) Summary position (consumer-first)

Permitting Internet Service Providers (ISPs) to provide Domestic Leased Circuits (DLCs) is likely to **increase competitive pressure** and **reduce effective tariffs** over time—especially where ISPs already have fibre, aggregation nodes, and enterprise last-mile reach. However, **without clear tariff transparency, non-discrimination, and QoS/SLA-linked accountability**, consumers (including SMEs and institutions in Tier-2/Tier-3/rural areas) may face **opaque pricing, hidden charges (notably local-lead add-ons), discriminatory discounting, and inconsistent service quality**.

2) Expected impact on competition

2.1 More suppliers and contestability

- The consultation paper explicitly anticipates that with the upcoming authorisation framework, **ISPs may be permitted** to provide DLCs and either build their own infrastructure or use leased dark fibre from infrastructure providers, thereby **competing with NLD operators**.
- This should improve **contestability** in many routes/markets (especially intra-city and metro-to-tier routes) where ISPs already operate dense access networks.

2.2 Product innovation and "bundled" competition

- Enterprise connectivity is increasingly delivered as a managed service (e.g., SD-WAN overlays) riding on fibre/Ethernet backbones. TRAI recognizes that **SD-WAN, DWDM, and evolving architectures** are reshaping DLC demand and expectations.
- If ISPs are allowed to sell DLCs, competition may shift from "pure circuit pricing" to **price + SLA + managed features** (monitoring, security, rapid provisioning), potentially benefiting consumers—*if* tariffs remain comparable and transparent.

2.3 Competitive benefits may be uneven

- TRAI also notes that **remote/hilly regions** still see high tariffs due to limited competition and infrastructure constraints.
- In such areas, "permission" alone will not deliver competition unless **backhaul and local access bottlenecks** are addressed (including local-lead economics and wholesale inputs).

3) Expected impact on tariffs (what may actually reduce consumer bills)

3.1 Downward pressure on headline tariffs (where networks overlap)

- Where ISPs already have fibre rings and PoPs, they can provision DLCs at lower incremental cost, which can translate into **lower tariffs** and **better negotiation outcomes** for enterprise/SME customers.

3.2 Total cost to customer may not fall unless "local lead" and add-ons are disciplined

- Even if the “core circuit” price declines, the **effective bill** can stay high due to: local-lead charges, one-time installation, shifting of splicing/ROW costs, or forced bundling of CPE/managed features.
- Therefore, consumer benefit depends on TRAI ensuring **all-in price comparability** (headline tariff + local-lead + OTCs + upgrades + restoration terms).

3.3 Efficiency gains from technology must be passed through

- TRAI flags technology advances (e.g., DWDM, SD-WAN evolution) that can reduce unit costs and enable scalable capacities.
- A competitive market should pass these gains to consumers, but where market power persists (dominant fibre owner on a route), **pass-through may be weak** without safeguards.

4) Consumer risks / unintended consequences if proposals are implemented without safeguards

Risk A — Opaque pricing and hidden charges

- Complex quotations and non-standard cost items (local lead, “last-mile feasibility,” restoration charges) can make DLCs **non-comparable** across providers, weakening competition in practice.

Risk B — Discriminatory pricing / margin squeeze

- Large integrated ISPs could offer selectively deep discounts to large enterprises while charging higher effective rates to SMEs and smaller institutional buyers, or squeeze smaller ISPs that buy wholesale bandwidth and transmission inputs.

Risk C — Quality dilution and SLA ambiguity

- If pricing is not tied to measurable SLA parameters (uptime, latency, packet loss, MTTR), consumers may pay "premium" tariffs while receiving "best-effort" performance.

Risk D — Reduced access in Tier-2/Tier-3 and rural markets

- TRAI notes smaller ISPs (especially ISP B/C) often rely on leasing DLCs due to limited own transmission infrastructure, and that DLC tariffs impact their costs.
- If wholesale inputs remain expensive or discriminatory, downstream retail prices may rise—reducing affordable connectivity expansion in smaller towns and rural habitations.

Risk E — Confusing market structure and accountability gaps

- With multiple layers (dark fibre lessor → ISP → managed DLC customer), fault attribution can become unclear unless responsibility is clearly placed on the selling entity.

5) Consumer-first regulatory safeguards suggested (forward-looking, light but effective)

5.1 Mandatory tariff transparency and bill comparability

- Require providers to publish/declare: (i) **base circuit tariff**, (ii) **local-lead tariff** (distance/medium-wise), (iii) one-time charges, (iv) restoration/MTTR commitments, (v) upgrade/downgrade charges, (vi) lock-in/early exit terms—so consumers can compare "apples-to-apples".

5.2 Non-discrimination and fair discounting

- Impose clear principles: same service class + same SLA + same geography → **non-discriminatory pricing**, with audited discount policies for bulk/volume deals to prevent exclusionary conduct.

5.3 SLA-linked tariffs (pay for performance, not promises)

- Create service-linked obligations: tariffs should map to measurable SLA tiers (e.g., higher price only when higher uptime/latency/MTTR is contractually committed and reported).
- Require minimum disclosure of SLA performance reporting to customers.

5.4 Wholesale protection to avoid Tier-2/Tier-3 inflation

- Where smaller ISPs depend on upstream transmission inputs, require **non-discriminatory wholesale access** and transparency in key cost elements to prevent margin squeeze and protect affordable downstream broadband.

5.5 Technology neutrality with "efficiency pass-through" expectation

- TRAI's recognition of evolving technologies (SD-WAN/DWDM, modern enterprise needs) supports a regime that is technology-neutral yet outcome-focused (lower provisioning cost → lower effective tariffs).

6) Conclusion

Allowing ISPs to provide DLCs is likely to **improve competition and reduce tariffs in many markets**, consistent with TRAI's view that this expansion can enable ISPs to compete with NLD operators and strengthen sector competition. But the **consumer outcome is not automatic**. TRAI should pair the permission with **tariff transparency (including local lead), non-discrimination, SLA-linked accountability, and wholesale fairness** so that the benefits reach **SMEs and users in Tier-2/Tier-3/rural areas**, not only large enterprise customers.

Q2: What is the likely impact of tariffs for DLC on the bandwidth charges (including the transmission costs) or any other costs incurred by ISP operators, especially for ISP B & C operators who do not have their own transmission infrastructure? Further, what are the specific elements of DLC tariff which can be addressed in the regulation to make it more relevant for ISP B & C business? Please provide your response with justification.

Comments :

High DLC tariffs disproportionately burden smaller ISPs (Category B & C), who depend on leasing circuits from larger operators. This creates consumer risks of inflated retail prices, limited competition, and reduced service availability in Tier-2/Tier-3 towns and rural areas. A forward-looking regulatory framework should:

- **Mitigate consumer risks** by ensuring equitable wholesale pricing for smaller ISPs, preventing downstream cost escalation for end-users.

- **Leverage technology advancements** (SD-WAN, DWDM, Ethernet over Fibre, cloud-based DLCs) to reduce provisioning costs and ensure efficiency gains are passed on to consumers.
- **Mandate transparency** in tariff structures, requiring operators to disclose local lead charges, transmission costs, and discount policies to avoid hidden or discriminatory pricing.
- **Link tariffs to service quality commitments** (uptime, latency, packet loss, SLA guarantees), ensuring consumers receive reliable services at fair prices.
- **Promote digital inclusion** by making bandwidth affordable for SMEs, institutions, and households in underserved regions, aligning with India's digital transformation goals.
- **Encourage competition and innovation** by enabling smaller ISPs to thrive, thereby expanding consumer choice and reducing risks of monopolistic pricing.

1. Consumer Benefits :

(a) Lower broadband prices through wholesale cost-flow effects
For most ISP-B/ISP-C operators, the **dominant "non-last-mile" input cost** is *leased backhaul / backbone bandwidth* (DLC or equivalent managed circuits) used to reach upstream PoPs, IXPs, or parent networks. When DLC tariffs are **rational, transparent, and cost-based**, they reduce (i) recurring transmission OPEX and (ii) "uncertainty premium" (hidden/variable charges). This improves the *economics of adding capacity per subscriber*, increasing the likelihood that savings are **passed through** into retail plans—especially in price-competitive local markets where many small ISPs operate. TRAI's current DLC framework is explicitly being revisited to assess

evolving technology and tariff relevance, indicating recognition that tariff structure can materially shape downstream outcomes.

(b) Better quality of service via service-linked wholesale pricing
If tariffs are coupled with **standardised SLAs/QoS** (uptime, restoration time, latency/jitter where applicable), ISPs can buy *predictable* transmission quality and design more stable retail offerings. This supports fewer outages, better peak-time performance, and fewer "congestion excuses" that consumers currently experience when upstream/backhaul is under-provisioned due to cost constraints.

(c) Expanded rural/underserved access through viable backhaul economics
In rural and Tier-2/Tier-3 areas, the "distance + local lead + limited supplier choice" problem makes transmission disproportionately expensive for small ISPs. India's public fibre expansion (e.g., BharatNet scale-up, fibre length, and service-ready GPs) means a larger wholesale backbone is physically available; **tariff design determines whether it becomes *commercially usable*** by ISP-B/ISP-C operators at affordable, predictable rates.

2. Consumer Risks / Side-Effects

Risk 1 — Weak or delayed pass-through to retail tariffs
Even if wholesale DLC prices fall, retail broadband prices may not drop proportionally if: (i) local markets lack competition, (ii) ISPs use gains to repair balance sheets, or (iii) discounts are selectively offered only to large buyers. **Mitigation:** require *wholesale transparency* + *non-discrimination*

(publish rate cards, discount principles, and reference offers), and monitor outcomes through periodic wholesale-to-retail competition indicators.

Risk 2 — Reduced competition if tariffs remain high or opaque If tariffs stay above cost or include unpredictable "add-ons" (local lead, spur fibre, port, cross-connect, restoration), ISP-B/ISP-C viability weakens, pushing consolidation and reducing consumer choice. Notably, reporting around the current review highlights that **existing ceilings cover limited capacities and have been unchanged for years**, creating risk of misalignment with market realities.

Risk 3 — Service degradation if price cuts are not service-linked If ceilings fall without enforceable SLA/QoS, suppliers may respond via lower maintenance priority, longer fault restoration, or "best-effort" delivery. **Mitigation:** standard SLA templates, automatic credits/penalties, and independent reporting of downtime/restoration.

3. Impact on ISP-B & ISP-C Operators (Cost Structure, Viability, Competition)

(a) DLC tariffs directly set the "bandwidth charge floor" for small ISPs For ISP-B/ISP-C operators without transmission assets, DLC is effectively a **wholesale input** that determines:

- cost per Mbps of backhaul (recurring rentals),
- cost of reaching upstream PoPs (distance/local lead), and
- speed/cost of scaling capacity (upgrade and provisioning charges).

When these are high, the ISP must either (i) raise retail prices, (ii) cap

usage (FUP/quality throttling), or (iii) under-invest in redundancy—each harming consumers.

(b) Tariff asymmetry creates a structural disadvantage
Integrated operators (with own fibre) treat transmission as a largely sunk/capex-optimised asset; smaller ISPs face **variable OPEX per route and per Mbps**. This asymmetry:

- raises entry barriers (especially outside metros),
- compresses margins (making service/innovation harder), and
- limits last-mile innovation (FTTH expansion stalls if backhaul economics are uncertain).

(c) Investment logic for ISP-B/ISP-C depends on predictability, not just price
Even moderate tariffs can be workable if they are **stable, transparent, and scalable** (clear upgrade paths, known local lead rules, predictable fault repair). Opaque "other costs" (cross connects, local lead, miscellaneous charges) are often more damaging than headline bandwidth rentals because they disrupt planning and financing.

4. Forward-Looking Perspective with Technology Advancements

Why the "old DLC tariff shape" becomes less relevant :
Technology evolution has shifted networks from narrowband circuits to **Ethernet/IP-MPLS, SD-WAN overlays, SDN/NFV automation, and high-capacity optical backbones**. TRAI's current review explicitly flags technological advancement as part of DLC tariff considerations. Implications:

- Demand is increasingly for **scalable Mbps/Gbps Ethernet services**, not a few legacy capacity steps.
- Costs decline with fibre densification, DWDM, and automation—supporting **periodic recalibration** of tariffs to cost curves.
- 5G densification and fibreization increase backhaul demand; without appropriate wholesale pricing, small ISPs can be crowded out.

Future-proof approach

Regulation should be **technology-neutral and service-parameter-based** (bandwidth + SLA/QoS + geography), not tied to a small set of historical capacities or legacy architectures.

5. Industry Change & Market Dynamics

(a) Tariff reform can improve competition without discouraging investment

A well-designed framework can:

- preserve supplier incentives (reasonable ROCE, utilisation assumptions), while
- preventing exclusionary pricing that blocks ISP-B/ISP-C growth.
  Earlier TRAI work has historically used cost-based methodologies for leased lines, reflecting the suitability of cost orientation for essential wholesale inputs.

(b) Open-access and neutral host models make wholesale price design decisive

Large public fibre footprint (e.g., BharatNet utilisation via leasing bandwidth/dark fibre, and significant OFC expansion) indicates growing

potential for **open access wholesale backhaul**—but only if price and access terms are simple, published, and nondiscriminatory.

6. Specific Regulatory Elements to Address

1. **Cost-based tariff ceilings with glide paths**

- Update ceilings using transparent cost models; adopt a **glide path** to avoid shocks (e.g., step-down over 2–3 review cycles).

2. **Mandatory wholesale transparency and "no hidden add-ons"**

- Publish standard rate cards including: local lead, port, cross-connect, installation, migration/upgrade, and restoration charges.
- Require itemised billing and disclosure of any distance/route assumptions.

3. **Non-discriminatory access obligations + reference offers**

- Require a published **Reference Offer** (terms, delivery timelines, discount principles) and prohibit undue preference that disadvantages ISP-B/ISP-C.

4. **Standardised SLAs and QoS parameters**

- Minimum SLA templates (uptime, MTTR, provisioning time, planned downtime rules).
- Automatic service credits for breaches; escalation and reporting requirements.

5. **Capacity granularity and scalability (Mbps→Gbps continuum)**

- Move from a few capacity buckets to **more granular steps** (e.g., 10/50/100 Mbps up to multi-Gbps), aligned to Ethernet services.

6. **Periodic tariff review linked to technology cost curves**

- Review every 2–3 years (or triggered by material cost shifts) to reflect fibre densification, equipment cost trends, and utilisation changes.

7. **Rural/remote incentives and open-access alignment**

- Explicit rural discounts/rebates, or viability-gap support where competition is structurally limited.
- Encourage use of public networks (e.g., BharatNet) with clear wholesale terms and predictable pricing.

7. Justification :

Why these elements matter for ISP-B/ISP-C and consumers

- **Cost-based ceilings + glide paths** address the core issue: small ISPs' broadband prices are constrained by wholesale transmission OPEX; gradualism protects investment and avoids disruption. The fact that TRAI is reviewing DLC tariffs after a long interval and that prior ceilings covered limited capacities supports the rationale for an updated, more modern structure.
- **Transparency + "no hidden add-ons"** reduces effective prices and planning risk. For smaller ISPs, *unpredictable local lead and ancillary charges* can be more harmful than headline rentals because they block scale-up and financing—ultimately harming consumers through fewer providers and worse QoS.

- **Non-discrimination + reference offers** targets the competition problem: if discounts/priority delivery are concentrated among large buyers, smaller ISPs cannot compete, reducing consumer choice.
- **Standardised SLAs/QoS** ensure that any tariff rationalisation does not cause quality dilution. This aligns consumer interest (reliability) with wholesale incentives (credits/penalties).
- **Granular capacity steps + periodic review** matches modern bandwidth demand and technology cost curves—making the tariff framework relevant for Ethernet/IP-MPLS era use-cases rather than legacy capacity buckets. TRAI's consultation explicitly considers technology advancements in this context.
- **Rural incentives + open-access alignment** are justified because rural backhaul economics remain structurally weaker; BharatNet scale and leasing utilisation indicate that public fibre can support competitive last-mile delivery if the wholesale commercial model is usable by smaller ISPs.

Overall consumer-first conclusion: DLC tariffs are not just an enterprise input; they are a *wholesale bottleneck* that shapes whether small ISPs can viably deliver affordable, reliable broadband—especially beyond metros. Regulation should therefore focus on **cost-orientation, transparency, non-discrimination, and service-linked quality**, with periodic updates to stay aligned with technology and market structure.

Q3: Should the MPLS-VPN DLCs be brought under the tariff regulation framework? Please provide your response with justification.

Comments :

MPLS-VPN DLCs are widely used by enterprises, SMEs, and institutions for secure and scalable connectivity. Without tariff regulation, consumers face risks of opaque pricing, discriminatory practices, and inconsistent service quality. A forward-looking regulatory framework should:

- **Mitigate consumer risks** by bringing MPLS-VPN DLCs under tariff regulation, ensuring fair, transparent, and non-discriminatory pricing.
- **Leverage technology advancements** such as SD-WAN, Ethernet over Fibre, and cloud-based VPNs to reduce costs and improve service delivery, ensuring efficiency gains are passed on to consumers.
- **Mandate transparency in tariff disclosures**, requiring operators to publish clear breakdowns of bandwidth charges, local lead costs, and SLA-linked pricing to prevent hidden or arbitrary charges.
- **Tie tariffs to service quality commitments** (uptime, latency, packet loss, SLA guarantees), protecting consumers from paying premium rates for unreliable services.
- **Promote digital inclusion** by ensuring MPLS-VPN DLCs are affordable for SMEs and institutions in Tier-2/Tier-3 towns and rural areas, not just large enterprises in urban markets.
- **Encourage competition and innovation** by creating a level playing field where ISPs and NLDOs can adopt advanced technologies, thereby expanding consumer choice and reducing risks of monopolistic pricing.

1. Consumer Benefits

1.1 Lower enterprise connectivity costs → lower prices for SMEs and downstream consumers

MPLS-VPN services are widely used by enterprises (including banks, retail chains, hospitals, logistics, SMEs) for multi-site connectivity. Where MPLS-VPN pricing is **opaque or significantly above underlying transport costs**, enterprises pay more for essential connectivity; this increases their operating costs and can ultimately raise end-consumer prices (for goods/services) and reduce the ability of SMEs to digitise. TRAI's current DLC tariff review explicitly recognises the surge in enterprise demand driven by cloud computing, ERP, video conferencing, etc., and discusses VPNs (often MPLS-based) as a major part of the modern DLC ecosystem.

1.2 Improved affordability and digital inclusion via wholesale tariff transparency

A key consumer-welfare channel is **competition and entry**: if smaller ISPs and managed service providers can buy MPLS-VPN-type wholesale connectivity at predictable, non-discriminatory terms, they can serve SMEs in Tier-2/Tier-3 markets, not only large metros. TRAI's earlier DLC review noted that **VPN tariffs were not under the ceiling-tariff framework** and explicitly raised the policy question of whether VPN tariffs should be regulated because VPNs are widely used.

1.3 Better service quality if regulation couples price with enforceable service parameters

MPLS-VPN is purchased for **reliability, predictable performance, and managed QoS**. If the regulatory framework mandates **standard SLAs/QoS disclosure** (uptime, restoration time, provisioning time, service credits), it can improve enterprise experience and reduce outages that propagate into

consumer-facing services (payments, e-commerce, telemedicine). TRAI's stated objective for the current DLC tariff review includes transparency and equitable affordable access—these objectives translate naturally into service-linked wholesale frameworks for VPN-type offerings as well.

2. Consumer Risks / Side Effects :

2.1 Risk: Reduced investment incentives or slower upgrades if regulation is too rigid

Hard ceilings, if set below efficient cost (or if not updated), may reduce incentives to expand capacity, modernise IP-MPLS cores, or improve redundancy—leading to poorer service quality for enterprises and, indirectly, consumers.

2.2 Risk: Tariff rigidity may slow innovation (SD-WAN, cloud interconnect, managed overlays)

MPLS-VPN is increasingly bundled with managed services (security, SD-WAN overlays, cloud connectivity). If regulation defines the product too narrowly or applies uniform ceilings to premium managed features, it may constrain innovation.

2.3 Mitigation strategies (consumer-protective but growth-friendly)

- **Flexible tariff bands / benchmark ranges** rather than a single hard ceiling for all variants (basic MPLS-VPN transport vs premium managed features).
- **Technology-neutral regulation** focused on *outcomes* (bandwidth, SLA, availability, latency class where relevant) rather than brand-names (MPLS/SD-WAN).

- **Periodic review** aligned with cost curves and utilisation changes—TRAI's current DLC tariff review itself is motivated by technology and market evolution, supporting periodic recalibration.

3. Impact on ISPs and Market Competition

3.1 Why MPLS-VPN pricing matters to ISP-B/ISP-C

Many ISP-B/ISP-C operators rely on wholesale leased transmission (DLC-type inputs) to:

- backhaul traffic from local last-mile networks, and/or
- serve SME/enterprise customers with multi-site connectivity via upstream or partner networks.

  If MPLS-VPN DLCs remain unregulated and pricing is opaque, smaller operators face higher and less predictable OPEX, reducing their ability to compete, expand last-mile, or offer enterprise services.

3.2 Risk of competition distortion under unregulated VPN tariffs

TRAI's earlier consultation explicitly observed that VPNs (not distance-based) were outside the DLC ceiling framework; this creates scope for **tariff asymmetry**—incumbents can price aggressively for large customers while keeping smaller buyers on higher effective rates, potentially squeezing ISP-B/ISP-C margins and weakening local competition.

3.3 What regulation could change

- **Level playing field:** non-discriminatory wholesale terms and published reference offers reduce the ability to selectively disadvantage smaller buyers.

- **Improved SME choice:** more providers can viably offer MPLS-class managed connectivity (or equivalent), especially outside metros, strengthening competitive pressure on prices and service quality.

4. Forward-Looking Perspective with Technology Advancements

4.1 Technology is changing the "VPN" construct—regulation should focus on service outcomes

Industry trends show SD-WAN services increasingly compete with traditional MPLS-VPN and can be layered over multiple underlays (broadband, 4G/5G, fibre). This evolution means "MPLS-VPN" is often not a standalone circuit but part of a managed architecture.

Implication: Regulation that is **technology-specific** risks becoming obsolete; regulation that is **service-parameter-based** stays relevant.

4.2 5G backhaul, fibre densification, virtualisation and open-access fibre change cost structures

As networks become more fibre-dense and more software-driven (SDN/NFV), unit costs for capacity and provisioning can fall—strengthening the case for **periodic review and updated benchmarks** rather than static tariffs.

4.3 Future-proof approach

- Define regulated scope as **"managed L2/L3 VPN connectivity services used for enterprise multi-site connectivity"** with clear separations between:
  (i) underlying access/transmission (the bottleneck input), and

(ii) value-added managed overlays (security, orchestration, analytics).

- Regulate the bottleneck element more strongly; apply lighter-touch rules to premium overlays.

5. Industry Change and Evolving Market Dynamics

5.1 Enterprise demand, cloud adoption, and DPI are increasing the strategic importance of reliable connectivity

TRAI's current DLC consultation links demand growth to cloud and enterprise application needs—these drivers are central to MPLS-VPN/managed VPN demand.

5.2 Regulation can support innovation and investment if designed as "smart forbearance"

Past stakeholder submissions show a clear split: some argue VPNs should not be regulated because they are logical services over physical circuits and could constrain service innovation.

Balanced conclusion: A hybrid model—stronger rules for bottleneck wholesale inputs + transparency/non-discrimination for managed VPN pricing—can support fair competition without freezing innovation.

6. Regulatory Options and Specific Elements to Address :

Option A — Bring MPLS-VPN DLCs fully under tariff regulation (strong intervention)

1. **Cost-based ceilings / benchmark ranges** for standard MPLS-VPN building blocks (port, access, core transport class).

2. **Mandatory transparency** (published rate cards + itemised bills; disclosure of all one-time and recurring charges).
3. **Non-discrimination** (reference offers; rules on volume discounts; prohibition of undue preference).
4. **Standard SLAs/QoS** (uptime, MTTR, provisioning timelines; credits/penalties).
5. **Periodic review** (2–3 years) aligned with technology cost curves and utilisation.
6. **Rural/remote provisions** (benchmark-based support or special ranges to avoid monopoly pricing).
7. **Premium service flexibility** (allow higher tariffs if objectively justified by higher SLA/QoS or managed features).

Option B — Partial regulation (recommended "balanced" approach)

- **Regulate the bottleneck inputs** (access/local lead, transmission/backhaul elements) and enforce transparency + non-discrimination for MPLS-VPN service packaging, rather than fixing one end-to-end ceiling for every VPN variant.
- Require **separate line items**: "underlay transport" vs "managed overlay" (SD-WAN orchestration, security, monitoring).

Option C — Forbearance with strengthened safeguards (light intervention)

- No tariff ceilings, but impose: transparency, reference offers, non-discrimination, SLA publication, and periodic market power/price monitoring—triggering ceilings only where competition is demonstrably weak.

7. Justification :

7.1 Why bring MPLS-VPN DLCs under a tariff framework at least partially

- TRAI has already acknowledged (in earlier consultation) that VPNs were outside DLC ceilings and raised whether this should change given the widespread use of VPNs.
- In the latest consultation cycle, TRAI's objectives explicitly include transparency, competition, and equitable affordability in the DLC market, while recognising technology evolution and enterprise demand growth. Extending *some* regulatory discipline to MPLS-VPN-type services is consistent with those objectives, because MPLS-VPN pricing can function as an essential input for SME digitalisation and for ISP-B/ISP-C competition.

7.2 Why not blanket-regulate every MPLS-VPN variant

- Credible stakeholder arguments caution that VPN is a logical service built over physical connectivity, and that rigid ceilings could reduce service differentiation and innovation.
- SD-WAN and cloud-based architectures blur product boundaries, strengthening the case for **technology-neutral, parameter-based** oversight rather than product-label ceilings.

7.3 Consumer-first balanced recommendation

Bring MPLS-VPN DLCs under the tariff regulation framework **in a calibrated manner**:

- **Yes, regulate the bottleneck input costs and impose strong transparency + non-discrimination + SLA disclosure** (high consumer and competition value, low innovation harm).
- **Use benchmark ranges / tariff bands** for standard service classes rather than uniform ceilings; allow **premium pricing only with objectively higher SLA/QoS or managed features**.
  This approach prioritises consumer welfare (affordability, competition, reliability), supports SME digitisation and national digital goals, while preserving incentives for network upgrades and service innovation in an evolving SD-WAN/cloud era.

Q4: What are the key differences in cost structure and service delivery between traditional P2P-DLCs and MPLS-VPNs that should be reflected in tariff regulation? Please provide your response with justification.

Comments :

While the technical cost structures of P2P-DLCs and MPLS-VPN DLCs differ, the absence of transparent regulation creates consumer risks of arbitrary pricing, hidden charges, and inconsistent service quality. A forward-looking regulatory framework should:

- **Mitigate consumer risks** by requiring operators to disclose clear cost breakdowns for both P2P and MPLS-VPN DLCs, preventing opaque or discriminatory practices.
- **Leverage technology advancements** (SD-WAN, DWDM, Ethernet over Fibre, cloud-based VPNs) to reduce provisioning costs and ensure efficiency gains are passed on to consumers.

- **Ensure transparency in tariff structures**, mandating uniform disclosure of service commitments (uptime, latency, packet loss, SLA guarantees) across both P2P and VPN models.
- **Protect consumers from unfair treatment** by ensuring that differences in provisioning methods do not result in unjustified price disparities or degraded service quality.
- **Promote digital inclusion** by ensuring SMEs, institutions, and consumers in Tier-2/Tier-3 towns and rural areas have equitable access to affordable DLCs, regardless of whether they are P2P or VPN-based.
- **Encourage competition and innovation** by creating a level playing field where providers can adopt diverse technologies without regulatory bias, thereby expanding consumer choice and reducing risks of monopolistic pricing.

1. Consumer Benefits :

1.1 More rational and affordable tariffs when regulation reflects cost causation

TRAI's current DLC consultation explicitly recognises two broad categories—**Point-to-Point (P2P) DLCs** and **VPNs**—implying that service models and cost drivers differ and should be assessed accordingly. If tariff regulation treats both as "one product," it risks mispricing either (i) dedicated P2P capacity or (ii) shared/core-based VPN delivery. Proper differentiation can produce **more transparent, cost-based price signals** for enterprises (especially SMEs) and for wholesale buyers (ISP-B/ISP-C), improving affordability and competitive outcomes.

1.2 Better service quality and availability through service-linked tariff design

P2P and MPLS-VPN typically come with different operational promises: MPLS-VPN often involves **traffic engineering/QoS classes and managed performance**, while P2P is often purchased for **dedicated throughput and simplicity**. A differentiated tariff framework can link *each service type's* price to appropriate **SLA/QoS parameters** (uptime, MTTR, provisioning time, latency class where relevant), improving reliability for enterprises and for consumer-facing digital services that depend on enterprise networks (payments, e-commerce, telemedicine).

1.3 Stronger SME and non-metro outcomes via predictable wholesale inputs

In many circles, SMEs and non-metro customers depend on smaller ISPs/MSPs who buy wholesale transmission. When the tariff model correctly unbundles and benchmarks the true cost components (access/local lead vs core vs managed features), it lowers "uncertainty premiums" and helps last-mile providers expand—an indirect but important consumer benefit through improved coverage and competitive retail outcomes.

2. Consumer Risks and Side Effects (Critical but Constructive)

2.1 Tariff distortion and cross-subsidisation if differences are ignored

If regulation imposes P2P-style distance/capacity ceilings onto MPLS-VPN (or treats MPLS-VPN as fully unregulated), prices can drift away from cost:

- **Over-regulation risk:** rigid ceilings could suppress investment in MPLS cores/QoS innovation.

- **Under-regulation risk:** opaque VPN pricing can embed excessive margins in “managed” bundles.

2.2 Risk to ISP-B/ISP-C if MPLS-VPN wholesale remains opaque/bundled

TRAI’s 2014 DLC consultation explicitly noted that **VPNs are not provisioned on distance basis**, so DLC ceilings were not applicable and VPN tariffs were not regulated—raising the question of whether regulation is needed because VPNs are widely used. If wholesale MPLS-VPN pricing stays bundled (access + port + core + management), smaller operators can face higher effective OPEX, weaker bargaining power, and reduced ability to offer enterprise services outside metros.

2.3 Mitigation strategies

- **Flexible tariff bands / benchmark ranges** (instead of single hard ceilings) for MPLS-VPN service classes.
- **Mandatory unbundling & transparency** (publish and bill separately: access/local lead, port, core, QoS class, managed overlay).
- **Periodic review** aligned with technology cost curves and utilisation changes—consistent with TRAI’s current review being motivated by market and technology evolution.

3. Technical and Cost Structure Differences (Core Analytical Section)

Below are the key differences that tariff regulation should reflect.

3.1 Network architecture & resource utilisation

P2P DLC (traditional leased circuit / dedicated path)

- Typically a **dedicated** logical connection between two endpoints; cost scales strongly with **route length**, protection design, and access/local lead.
- Pricing logic historically aligns to "two ends + distance/route + capacity."

MPLS-VPN (multi-site L3/L2 VPN over shared core)

- Uses a **shared MPLS core** with customer separation via labels/VRFs and often multiple sites on one VPN.
- Not naturally "distance-tariffed" site-to-site; cost is driven by **access tails + port capacity + core utilisation + QoS class + management overhead**. TRAI 2014 explicitly highlighted that VPNs are not distance-provisioned, hence outside distance-based ceilings.

Tariff implication:
Regulation should avoid forcing a distance-based P2P ceiling onto MPLS-VPN. MPLS-VPN needs **component-based (tail + port + class) benchmarks**, not pure distance slabs.

3.2 CAPEX and OPEX composition (what actually drives cost)

P2P DLC CAPEX/OPEX tends to be:

- Fibre/transport path provisioning and protection (ring/route diversity)
- Access/local lead build or lease
- Fewer service nodes (simpler service chain) → lower per-circuit service management cost

MPLS-VPN CAPEX/OPEX tends to be:

- PE routers, aggregation, core capacity, software/features (QoS, TE, security options)
- NMS/OSS, configuration, monitoring, policy/QoS operations (higher management overhead)
- Shared core utilisation costs and port-based scaling rather than distance scaling

A stakeholder submission in TRAI's 2014 process argued that MPLS-VPN includes a "leased circuit element" up to the MPLS point, and that **only that leased line component** should be under tariff regulation, while MPLS elements (routers/ports) may be treated differently.

Tariff implication:
Adopt **unbundled regulation**: regulate/benchmark the bottleneck "tail/access/transport" more strongly; allow structured flexibility for managed/core elements with transparency.

3.3 Scalability and multi-site connectivity

P2P DLC: scaling from 2 sites to N sites often requires **multiple circuits** (mesh or hub-and-spoke), driving costs roughly with number of links.
MPLS-VPN: adding sites can be comparatively efficient (add access tail + provisioning), leveraging shared core.

Tariff implication:
MPLS-VPN tariffs should reflect **per-site access + per-port bandwidth + per-VPN management**, not per link distance.

3.4 QoS, redundancy, traffic engineering

P2P DLC: can be engineered for high availability but QoS is often "capacity-assured" rather than multi-class QoS.
MPLS-VPN: typically marketed with **QoS classes, traffic engineering, and managed performance**, which increases operational complexity and may justify differentiated "class-based" pricing if objectively linked to measurable SLA.

TRAI's older consultation material has noted differences between point-to-point leased lines and Layer-2/Layer-3 VPNs, reinforcing that service characteristics differ materially.

Tariff implication:
Allow **premium QoS classes** within regulated bands, but only if tied to **standard SLA/QoS disclosure** and performance reporting.

3.5 Operational complexity and management overhead

P2P: simpler provisioning, monitoring, and fault isolation per circuit.
MPLS-VPN: multi-tenant, policy-rich environment—more OSS/BSS, NOC effort, change management and configuration complexity.

Tariff implication:
MPLS-VPN regulation should recognise **management overhead** explicitly (and transparently), rather than hiding it inside opaque bundled prices.

4. Forward-Looking Perspective with Technology Advancements

TRAI's 2026 consultation itself is anchored in "current market conditions and technological advancements," indicating the need for future-proof tariff models. Key trends:

- **SD-WAN overlays**: enterprises increasingly buy an orchestrated service that can run over MPLS, fibre broadband, 4G/5G—blurring "MPLS vs non-MPLS" distinctions.
- **Virtualised networks (SDN/NFV), cloud-based routing**: more software-driven cost curves, faster scaling, changing OPEX mix.
- **5G backhaul and fibre densification**: shift cost baselines for transport and access.
- **Open-access fibre / neutral host**: greater scope for competitive wholesale tails.

Future-proof approach: regulate based on **service outcomes and components** (access tail, bandwidth/port, SLA/QoS class, managed overlay), not on legacy labels.

5. Industry Change and Market Dynamics

- Enterprise connectivity demand is increasingly driven by **cloud adoption, multi-site applications, and digital public infrastructure**, increasing reliance on VPN-type managed services (as highlighted in TRAI's current DLC review).
- Market power often sits in the **access tail/local lead and dense route transport**, where competition may be limited—particularly relevant for ISP-B/ISP-C who depend on wholesale circuits.
- If MPLS-VPN wholesale remains unregulated and bundled, ISP-B/ISP-C may be constrained to "best-effort internet + overlays," limiting their ability to offer high-assurance enterprise services and reducing competitive pressure on incumbents.

6. Regulatory Elements to Reflect These Differences (Actionable)

1. **Separate tariff frameworks based on cost causation**

- **P2P DLC:** distance/route + capacity-based ceilings/benchmarks (where appropriate).
- **MPLS-VPN:** component-based benchmark ranges (tail/access + port/bandwidth + QoS class + management).

2. **Transparency and unbundling for MPLS-VPN**
   Mandate published and itemised pricing for:

- access/local lead per site,
- port/bandwidth charges,
- core/VPN service charge (if any),
- QoS class premium (if any),
- one-time provisioning/migration,
- redundancy/protection add-ons.

3. **Standardised SLAs and QoS parameters**

- Minimum SLA templates (uptime, MTTR, provisioning time; service credits).
- QoS class definitions (where offered) must map to measurable metrics.

4. **Cost-based tariff ceilings or benchmark ranges**

- Prefer **benchmark ranges/bands** for MPLS-VPN (to avoid rigidity), with stronger control on bottleneck tails.
- P2P can retain ceilings where market power is persistent.

5. **Periodic review linked to technology cost curves**

6. Review every 2–3 years (or triggered by major cost shifts), aligned with TRAI's rationale for revisiting the framework due to market/technology evolution.
7. **Rural/remote and ISP-B/ISP-C provisions**

- Special benchmarks for rural tails; enforce non-discrimination and reference offers to prevent excessive "local lead" premiums.
- Ensure wholesale offers are available at smaller increments suitable for SME and regional ISP demand.

7. Justification :

- **Evidence of structural difference:** TRAI has long recognised that VPNs differ from P2P in provisioning logic—VPNs not being distance-based meant they fell outside P2P ceiling tariffs, prompting consultation on whether and how to regulate VPN tariffs.
- **Legal/regulatory framing:** TRAI's DLC regulations define "leased circuit" broadly to include **VPNs using circuit or packet-switched (IP) technology** alongside point-to-point connections—supporting the principle that VPN-type services can be within the regulatory ambit, but may require different tariff mechanics.
- **Balanced implementation logic:** Stakeholder reasoning in the 2014 process supports a calibrated approach—regulate the **leased circuit element** of MPLS-VPN more strongly while allowing structured flexibility for MPLS equipment/port-related elements—provided transparency and non-discrimination are ensured.
- **Consumer-first outcome:** A differentiated framework reduces the risk of mispricing, improves transparency, supports SME

affordability, and enables ISP-B/ISP-C participation—strengthening competition, which is consistent with TRAI's stated objectives for the current DLC tariff review (transparency, competition, equitable affordable access).

Conclusion:

Yes—tariff regulation should explicitly reflect that **P2P DLCs are dedicated, route-driven services**, while **MPLS-VPNs are shared-core, multi-site, policy-managed services** whose costs are best captured via **unbundled, component-based benchmarks and SLA/QoS-linked classes**. This calibrated differentiation is most likely to protect consumers and SMEs, preserve incentives for operator investment, and support sustainable competition—especially for ISP-B/ISP-C in non-metro markets.

Q5: What has been the impact of deployment of DWDM, SD-WAN and Ethernet over Fibre on provisioning of DLCs, in terms of operations, costs and tariffs? Should the regulation incorporate these technological changes in the ceiling tariff framework? Please provide your response with justification.

Comments :

Emerging technologies such as DWDM, SD-WAN, and Ethernet over Fibre have significantly reduced provisioning costs and improved service quality. However, if tariffs are not updated to reflect these efficiencies, consumers face risks of overpaying for services, limited transparency, and unequal access. A forward-looking regulatory framework should:

- **Mitigate consumer risks** by recalibrating ceiling tariffs to reflect efficiency gains, ensuring consumers are not charged legacy rates for modern, cost-effective technologies.
- **Mandate transparency** in tariff structures, requiring operators to disclose how technology choices impact costs and service delivery, preventing hidden or discriminatory pricing.
- **Leverage technology advancements** to deliver scalable, reliable, and affordable services, ensuring efficiency gains are passed on to consumers rather than retained solely by providers.
- **Tie tariffs to service quality commitments** (uptime, latency, packet loss, SLA guarantees), protecting consumers from paying premium rates without guaranteed performance.
- **Promote digital inclusion** by ensuring that benefits of advanced technologies reach Tier-2/Tier-3 towns and rural areas, not just urban markets, thereby reducing regional disparities.
- **Encourage competition and innovation** by creating a level playing field where ISPs and NLDOs can adopt diverse technologies without regulatory bias, expanding consumer choice and reducing risks of monopolistic pricing.

1. Consumer Benefits :

1.1 Higher bandwidth availability and lower unit costs (DWDM + Ethernet over Fibre)

Deployment of **DWDM** increases the amount of traffic carried over the *same* fibre by multiplexing multiple wavelengths, allowing operators to expand capacity without proportionate new fibre builds—an established industry rationale for using DWDM to increase effective bandwidth while

constraining costs. This drives a **decline in transport cost per bit**, which is the key economic lever behind falling per-Mbps prices over time.

Similarly, **Carrier/Metro Ethernet over fibre** replaces legacy TDM/SDH layers for many business services and supports standardised service attributes and service assurance, helping operators deliver bandwidth in scalable increments (10/100/1000 Mbps and beyond) rather than fixed legacy steps.

1.2 Better quality and reliability through modern service assurance and engineering

Ethernet service assurance frameworks (bandwidth profiles, service level specifications, performance monitoring) support clearer SLAs and better fault/performance management, which can translate into higher reliability for enterprise connectivity and the consumer-facing services that depend on it (payments, e-commerce, telemedicine).

1.3 SD-WAN efficiency gains can indirectly benefit consumers through competitive pressure

SD-WAN is widely described as a software overlay that can use multiple underlays (including broadband/LTE and MPLS), shifting value from “pure circuit” to software-driven policy control and dynamic path selection. This can reduce effective enterprise WAN costs (where appropriate) and accelerate rollout for multi-site connectivity, which improves SME affordability and can increase competitive pressure downstream (including for ISP-B/ISP-C offerings to business customers).

Cost-flow logic (why consumers can gain): when backhaul/transport cost per Mbps falls (DWDM/Ethernet) and provisioning becomes faster/more

automated (Ethernet/SDN practices), the “wholesale connectivity input” becomes cheaper and more predictable. This enables (i) lower enterprise connectivity costs and (ii) healthier ISP competition—both of which can reduce end-user prices and improve service quality in competitive markets.

2. Consumer Risks and Side Effects :

2.1 Tariff distortion if regulation remains anchored to legacy capacity constructs

India’s existing ceiling tariff structure for DLCs has historically been expressed in legacy capacity steps such as **E1/DS-3/STM-1/STM-4**. If ceilings are not updated to reflect Ethernet/Gbps economics, there is a risk of (a) **over-pricing “legacy-label” DLCs** despite falling cost per bit, or (b) creating arbitrage where modern services (Ethernet) remain outside effective discipline while legacy ceilings become irrelevant.

2.2 Reduced transparency due to bundling (especially MPLS/SD-WAN packages)

SD-WAN and managed Ethernet services often bundle underlay circuits, CPE, orchestration, security, and monitoring. Without required unbundling, customers (and smaller ISPs buying wholesale) may face **opaque pricing** and cannot assess whether transport cost reductions are being passed through.

2.3 Risks for ISP-B/ISP-C if wholesale prices remain misaligned with modern cost curves

Where ISP-B/ISP-C operators rely on wholesale transmission, misalignment between actual cost declines (DWDM/Ethernet efficiencies) and charged wholesale tariffs can raise their OPEX, limit last-mile expansion, and reduce

competition—ultimately harming consumers via higher prices and fewer choices.

Mitigations (consumer-first, growth-friendly):

- **Technology-neutral tariff principles** (cost causation + service parameters) rather than "legacy capacity labels".
- **Transparency + unbundling obligations** for SD-WAN/managed Ethernet offerings (separate underlay transport from overlay/software and CPE).
- **Periodic reviews** to ensure ceilings track technology cost curves—aligned with TRAI's stated purpose of reviewing the ceiling framework "in line with… technological advancements" and promoting transparency/competition.

3. Operational and Cost Structure Impact of New Technologies

3.1 DWDM: higher fibre capacity → lower per-Mbps cost and different provisioning economics

- **Operational impact:** capacity upgrades can increasingly be achieved by lighting additional wavelengths / upgrading optics, rather than laying new fibre on every route; also improves resilience options through diverse wavelength planning.
- **Cost impact:** multiple sources describe DWDM as reducing transport cost per bit/operating cost by carrying more bits per second over long distances.

- **Tariff implication:** when unit transport costs fall structurally, ceiling tariffs should not remain static for long periods; otherwise, a widening gap emerges between efficient cost and regulated ceiling.

3.2 SD-WAN: shifts value from physical circuits to software overlay → changes how costs should be allocated

- **Operational impact:** SD-WAN centralises policy control, automates path selection, and can use multiple underlays (MPLS, broadband, 4G/5G), enabling faster turn-up and flexible traffic steering.
- **Cost impact:** SD-WAN can reduce reliance on expensive dedicated circuits by leveraging cost-effective broadband where suitable, but retains premium paths (MPLS/assured) for critical apps.
- **Tariff implication:** regulation should avoid "ceilinging" an end-to-end SD-WAN bundle as if it were only transport. Instead, it should **discipline the bottleneck transport component** (where market power exists) and require **unbundled disclosure** of overlay/software/CPE charges.

3.3 Ethernet over Fibre: simplifies service layers → reduces OPEX and provisioning time; supports granular bandwidth scaling

- **Operational impact:** standardised Carrier Ethernet service attributes streamline and accelerate provisioning and improve service assurance/fault management.
- **Cost impact:** Ethernet's cost model and standardisation are commonly associated with cost reduction and easier service delivery compared to legacy approaches.

- **Tariff implication:** ceiling structures should reflect **Ethernet service classes** and **granular bandwidth steps**, not only legacy SDH steps, to remain relevant.

3.4 Comparison vs traditional DLC provisioning (what changes materially)

- Traditional frameworks mapped well to legacy provisioning (TDM/SDH distance/capacity slabs). The current ceilings still explicitly list legacy capacities (E1/DS-3/STM-1/STM-4).
- Modern networks increasingly provision business services as Ethernet/IP services over high-capacity optical transport (DWDM), with overlays (SD-WAN) adding software value. Hence, **cost drivers** shift toward: optical/equipment efficiency, port/bandwidth scaling, automation/OSS, and SLA-linked service assurance.

4. Forward-Looking Perspective with Technology Advancements

4.1 Next changes: virtualised networks, cloud routing, 5G backhaul, open access fibre, slicing

TRAI's current review explicitly seeks views to update the ceiling tariff framework in line with technology advancements. Over the next cycle, DLC economics will also be shaped by:

- **virtualised/SDN operations** (lower provisioning and change-management costs),
- **5G backhaul growth** and higher fibreization,
- **open-access/neutral wholesale models** (greater supply of fibre/backhaul options), and

- (in mobile contexts) network slicing concepts that accelerate service customisation (though not a direct substitute for fixed DLCs).

4.2 Future-proof regulatory approach

Adopt **technology-neutral, service-parameter-based regulation**: define regulated products by measurable parameters (bandwidth, symmetry, SLA/QoS class, MTTR/provisioning time, geography) and **cost causation**, rather than by the underlying technology label.

5. Industry Change and Market Dynamics

5.1 Demand shift: multi-cloud + DPI + enterprise digitisation increases reliance on scalable, assured connectivity

The latest TRAI DLC consultation highlights the need to revisit ceilings considering market evolution and technology, with objectives of transparency, competition, and equitable affordable access. These demand shifts increase the importance of **scalable Ethernet/DWDM-enabled services** and **software-managed WANs**.

5.2 Competition implications for ISP-B/ISP-C

ISP-B/ISP-C operators are typically more sensitive to wholesale bandwidth costs. If ceilings/benchmarks do not reflect technology-driven cost reductions, they face higher effective OPEX, reduced ability to offer competitive business and backhaul services, and slower last-mile expansion—reducing consumer choice and weakening pass-through benefits.

6. Regulatory Recommendations Reflecting Technological Change :

1. **Update ceiling tariffs to reflect DWDM-enabled cost reductions**

2. Re-estimate efficient cost assumptions (capacity utilisation, equipment evolution) and revise ceilings accordingly, consistent with the purpose of reviewing ceilings in line with technology advancements. **Introduce technology-neutral tariff principles (replace legacy-capacity anchoring)**

- Move from a framework centred on E1/DS-3/STM-1/STM-4 to **Ethernet bandwidth ranges/steps** (e.g., 10 Mbps to multi-Gbps) and SLA-linked service categories. Existing consolidated tariff schedules show the legacy capacity basis, underscoring the need to modernise.

3. **Mandate transparency for SD-WAN and Ethernet-over-Fibre wholesale pricing**

- Require publication and itemised billing of: underlay access/local lead, port charges, transport bandwidth, restoration/protection, and separately, SD-WAN overlay/software/CPE/security components.

4. **Unbundle physical and software-defined components**

- Regulate (or benchmark) the **bottleneck transport** component where market power exists; apply lighter-touch oversight to overlay features but require disclosure and non-discrimination.

5. **Standardise SLAs and QoS parameters for regulated classes**

   Use MEF-style service assurance concepts (bandwidth profiles, service level specifications, performance monitoring) as reference for defining measurable obligations and credits.

6. **Periodic tariff review aligned with technology cost curves**

- A fixed multi-year review cycle (e.g., 2–3 years) or trigger-based review to ensure ceilings track declining cost per bit (DWDM/optics, automation).

7. **Incentives/guardrails for rural and remote connectivity**

- Rural "local lead/backhaul" components should be separately benchmarked with transparency and non-discrimination to prevent excessive mark-ups that harm SMEs, public service delivery, and last-mile ISPs.

7. Justification (Balanced, Evidence-Linked, Consumer-First)

- **Why technology must be incorporated:** DWDM is widely characterised as a method to expand fibre capacity and reduce transport cost per bit/operating cost, so leaving ceilings unchanged for long periods risks tariffs diverging from efficient costs.
- **Why the framework should evolve beyond legacy capacity buckets:** the consolidated tariff order still expresses ceilings using E1/DS-3/STM-1/STM-4 capacities, which is increasingly misaligned with Ethernet/Gbps-centric provisioning and software-managed services.
- **Why SD-WAN requires unbundling, not blunt ceilings:** SD-WAN is explicitly described as an overlay leveraging multiple underlays and shifting value to software orchestration; therefore, consumer-friendly regulation should discipline bottleneck transport costs and

ensure transparency of bundled elements rather than fixing a single ceiling for an entire managed bundle.

- **Why periodic review is appropriate:** TRAI/PIB state that the review aims to align the ceiling tariff framework with current market conditions and technological advancements, with goals of transparency, competition, and equitable affordability—objectives best served by periodic recalibration and service-parameter-based regulation.

Conclusion:

DWDM, Ethernet over fibre, and SD-WAN have materially reduced unit transport costs, simplified provisioning, and shifted value toward software-managed service layers. Regulation should therefore **incorporate these technological changes** by modernising the ceiling tariff framework into a **technology-neutral, Ethernet/Gbps-oriented, SLA-linked, unbundled tariff regime**, with **periodic reviews** to ensure that technology-driven efficiencies are transparently and fairly reflected in wholesale/enterprise tariffs—protecting consumers while maintaining sustainable incentives for network investment.

Q6: Are there any other technological changes apart from the ones mentioned in above paragraphs in provisioning of DLCs in India? If yes, what has been the impact of deployment of such technologies on provisioning of DLCs, in terms of operations, costs and tariffs? Should the regulation incorporate these technological changes in the ceiling tariff framework? Please provide your response with justification.

Comments :

Beyond DWDM, SD-WAN, and Ethernet over Fibre, several emerging technologies—such as cloud-based DLCs, virtualized networks, and AI-driven traffic management—are reshaping cost structures and service delivery. If tariffs are not updated to reflect these innovations, consumers face risks of overpaying, opaque pricing, and unequal access. A forward-looking regulatory framework should:

- **Mitigate consumer risks** by ensuring that efficiency gains from new technologies are passed on to end-users, preventing legacy tariffs from inflating costs.
- **Mandate transparency** in tariff disclosures, requiring operators to clearly outline how new technologies affect costs, service quality, and pricing.
- **Leverage technology advancements** (cloud DLCs, virtualization, AI monitoring) to deliver scalable, reliable, and affordable services, ensuring consumers benefit from innovation rather than being exposed to hidden risks.
- **Tie tariffs to measurable service quality commitments** (uptime, latency, packet loss, SLA guarantees), protecting consumers from paying premium rates without guaranteed performance.
- **Promote digital inclusion** by ensuring that advanced technologies are deployed equitably, so Tier-2/Tier-3 towns and rural areas benefit alongside urban markets.
- **Encourage competition and innovation** by creating a level playing field where ISPs and NLDOs can adopt diverse technologies without

regulatory bias, expanding consumer choice and reducing risks of monopolistic pricing.

1. Consumer Benefits :

1.1 Additional technologies are materially improving capacity, resilience and unit costs :

Beyond DWDM/SD-WAN/Ethernet-over-Fibre, the DLC ecosystem in India is also being shaped by: **OTN (G.709 "digital wrapper"), packet-optical integration (IP-over-DWDM / IP-over-OTN), coherent optics/ROADM upgrades, GPON/XGS-PON/NG-PON2-based fibre-deep architectures, transport SDN/automation, and open-access/neutral wholesale fibre models**. These changes generally (i) raise usable capacity per fibre, (ii) reduce equipment layers and power/space, and (iii) shorten provisioning cycles—drivers of lower long-run cost per bit and better service assurance. For example, OTN encapsulates multiple traffic types with enhanced multiplexing, enabling more efficient optical transport.

1.2 Cost-flow to consumers: cheaper, faster wholesale connectivity improves retail competition and quality :

Where DLCs (or managed circuits) are a major wholesale input for enterprise connectivity and for ISP-B/ISP-C backhaul, **lower per-Mbps transport cost + faster provisioning + clearer SLAs** typically improve competition and service outcomes. TRAI's 2026 DLC tariff consultation explicitly frames the review as aligning the ceiling tariff framework with **current market conditions and technological advancements**, with objectives of **transparency, competition and equitable/affordable**

access—a consumer-welfare pathway that depends on tariffs tracking modern cost structures.

1.3 Open-access fibre and wholesale utilisation can expand affordable access in underserved areas

A practical consumer benefit arises when **wholesale fibre/backhaul is made commercially usable** for multiple service providers. Government sources note BharatNet utilisation through **leasing bandwidth and dark fibre**, supporting a wholesale/open access style of use that can reduce entry barriers for last-mile providers in rural areas.

2. Consumer Risks and Side Effects :

2.1 Tariff distortion if regulation remains anchored to legacy cost models

If ceiling tariffs remain tied to older capacity constructs and provisioning assumptions while networks shift to packet-optical/OTN/automation, a gap can emerge between **efficient cost** and **regulated ceiling**, enabling (a) over-pricing of "legacy-label" circuits, or (b) migration to unregulated/bundled variants where price discipline is weaker—reducing consumer pass-through.

2.2 Reduced transparency from bundling and virtualisation

Virtualised transport and managed services (e.g., "SD-WAN + underlay + security + monitoring") can obscure the share of cost attributable to the *bottleneck transport* vs overlay features. Without unbundling, small enterprises and ISP-B/ISP-C buyers may face **opaque effective prices** and unpredictable add-ons.

2.3 Entry barriers for ISP-B/ISP-C if advanced tech advantages are not reflected in wholesale pricing

Packet-optical integration and automation can create major efficiency gains mainly for large, integrated networks. If wholesale tariffs do not reflect those cost reductions—or if access to open-access fibre is limited—smaller ISPs can be squeezed, harming consumer choice.

Mitigations :

- **Technology-neutral tariff principles** (cost causation + measurable service parameters), not technology labels.
- **Mandatory wholesale transparency and unbundling** (transport vs overlay, local lead/access vs core).
- **Periodic tariff review** to keep ceilings aligned with technology cost curves—consistent with TRAI's stated rationale for the ongoing review.

3. Operational and Cost Structure Impact of New Technologies

Below are key "other" technologies and how they change operations, costs, and tariff relevance.

3.1 Optical Transport Network (OTN) and packet-optical integration (IP-over-OTN / IP-over-DWDM)

- **Operational impact:** OTN provides a structured "wrapper" enabling efficient multiplexing and transport of diverse client signals with strong OAM capabilities.
- **Cost impact:** Packet-optical convergence reduces the number of intermediate optical components and layers, lowering

footprint/power and simplifying troubleshooting—reducing OPEX and sometimes CAPEX.

- **Tariff design implication:** ceilings should reflect that modern optical stacks reduce per-bit transport cost and support scalable increments (Gbps-centric). A static ceiling framework risks becoming non-binding or misaligned.

3.2 GPON / XGS-PON / NG-PON2 and fibre-deep architectures (FTTx for business/backhaul)

- **Operational impact:** PON upgrades allow higher access rates and can deliver enterprise/mobile backhaul services without rebuilding outside plant, enabling faster upgrades and broader fibre-deep reach.
- **Cost impact:** shared-medium access can lower marginal cost for certain last-mile scenarios (where service assurance requirements can be met), changing the "local lead/access" cost curve.
- **Tariff design implication:** regulation should separate **access/local lead** pricing from **core transport**, and allow differentiated SLA classes (because PON-based delivery may have different contention/assurance profiles unless engineered accordingly).

3.3 Software-defined transport, network automation, and SDN controllers

- **Operational impact:** automation can materially shorten provisioning cycles (reductions "from weeks to days/hours" are commonly reported) and reduce manual configuration/testing overhead.

- **Cost impact:** lower fulfilment cost per circuit, fewer truck rolls, and lower error rates → OPEX savings; faster turn-up improves revenue realisation and customer experience.
- **Tariff design implication:** ceilings and regulated charges should not embed outdated provisioning cost assumptions; one-time charges (installation, augmentation, reconfiguration) may need re-benchmarking and stronger transparency.

3.4 Carrier Ethernet "service assurance" evolution (MEF 3.0 and orchestrated services)

- **Operational impact:** industry standards emphasise automated, orchestrated, performance-assured Ethernet services across provider boundaries—relevant for wholesale DLC-like products.
- **Tariff design implication:** link tariffs to standardised SLA/QoS metrics (availability, restoration, latency class where offered) and require performance reporting—so lower costs do not come at the expense of quality.

3.5 Virtualised network functions (VNF), cloud-based routing, and disaggregated/"open line system" approaches (where adopted)

- **Operational impact:** functions move to software and central control; operations become more programmable, enabling faster changes and dynamic capacity allocation.
- **Cost impact:** potential shift from CAPEX-heavy appliances to software/licensing/compute OPEX; cost allocation becomes less "per-circuit hardware" and more "shared platform."

- **Tariff design implication:** requires unbundling: (i) bottleneck transport/access vs (ii) value-added virtualised features.

3.6 Open-access fibre and neutral-host wholesale models

- **Operational impact:** multiple service providers share a common fibre infrastructure; provisioning becomes more "wholesale productised" with standard interfaces/processes.
- **Cost impact:** improved asset utilisation and lower duplicate builds can reduce long-run costs and accelerate coverage expansion.
- **Tariff design implication:** regulated terms should ensure **non-discriminatory** wholesale access and published reference offers, particularly where the wholesale provider has significant market power.

4. Forward-Looking Perspective with Technology Advancements

4.1 What is next: cloud-native routing, 5G backhaul, slicing concepts, AI-driven automation

TRAI's consultation explicitly seeks views to update the ceiling tariff framework aligned with technological advancements and market conditions.

Going forward, DLC economics will be shaped by: deeper fibreisation for 5G backhaul, more packet-optical integration, programmable transport, and AI-assisted operations (fault prediction, automated restoration). These trends generally reduce OPEX per service and enable more dynamic bandwidth offerings—challenging static, legacy capacity-bucket ceilings.

4.2 Future-proof regulatory approach

Adopt **service-parameter-based and technology-neutral regulation**: define regulated products by (a) bandwidth, (b) geography/access category, (c) SLA/QoS class, and (d) provisioning/restoration commitments, while ensuring transparent component pricing.

5. Industry Change and Market Dynamics

5.1 Demand drivers: enterprise digitisation, multi-cloud, DPI growth, and fibre densification :

These forces increase demand for scalable, assured connectivity and shorten tolerance for long provisioning cycles—making automation/packet-optical/OTN efficiencies more economically consequential. TRAI's present review is explicitly positioned to account for these evolving conditions.

5.2 Implications for ISP-B/ISP-C

Smaller ISPs are typically more sensitive to wholesale transmission costs and one-time charges. If technology-driven cost reductions are not reflected in wholesale benchmarks/ceilings—or if open access is not effectively nondiscriminatory—ISP-B/ISP-C OPEX remains high, limiting last-mile expansion and weakening consumer competition.

6. Regulatory Recommendations Reflecting Technological Change : Update ceilings/benchmarks to reflect modern optical and automation cost curves

- Re-estimate efficient cost assumptions for transport and provisioning in light of OTN/packet-optical integration and automation-driven fulfilment efficiencies.

2. **Introduce technology-neutral tariff principles**

- Move from legacy technology labels toward **bandwidth + SLA/QoS class + geography/access category**.

3. **Mandate transparency and unbundling for advanced/virtualised offerings**

- Require itemised disclosure for: access/local lead, port/bandwidth, protection/restoration, and separately any software/overlay/managed elements (VNF, orchestration, security).

4. **Standardise SLAs and QoS parameters**

- Define minimum SLA templates and performance reporting expectations aligned to modern Carrier Ethernet service assurance thinking.

5. **Periodic tariff review aligned with technology cost curves**

- A 2–3 year review cycle (or trigger-based review) to prevent ceilings drifting away from efficient costs—consistent with the intent of the current TRAI review to align with evolving technology/market conditions.

6. **Rural/remote provisions and support for last-mile ISPs**

- Stronger controls on local lead/access mark-ups in low-competition areas; facilitate use of wholesale/open access networks (e.g., BharatNet leasing) with published reference terms.

7. Justification :

- **Yes, there are additional technological changes**—OTN/packet-optical integration, PON evolution (GPON→NG-PON2), transport SDN/automation, orchestrated Carrier Ethernet, and open-access fibre models—each reshaping provisioning time, cost allocation, and per-bit economics.
- **Regulation should incorporate these changes**, because TRAI's own stated purpose for the current exercise is to review the ceiling tariff framework **in line with current market conditions and technological advancements** to promote transparency, competition, and equitable affordability.
- **The least-regret method is technology-neutral, unbundled and SLA-linked:** it preserves incentives for operators to invest in next-gen transport and automation (since efficient costs and premium SLA classes can be recognised), while ensuring that technology-driven efficiencies are not locked inside opaque bundles—protecting SME affordability, ISP-B/ISP-C viability, and ultimately consumer welfare.

Conclusion:

Technological change in DLC provisioning in India extends well beyond DWDM/SD-WAN/Ethernet-over-Fibre. The ceiling tariff framework should be modernised to reflect OTN/packet-optical convergence, fibre-deep PON evolution, automation-driven provisioning efficiencies, and open-access wholesale models through **technology-neutral service definitions, component unbundling, SLA/QoS standardisation, and periodic cost-curve-linked reviews**—balancing operator sustainability with consumer-first affordability and digital inclusion.

Q7: As an alternative to Q5 & Q6, should the Authority consider technology-neutral tariff models, focussing on bandwidth and service commitments rather than provisioning technologies? If yes, what should be the criteria for the same? Please provide your response with justification.

Comments :

Legacy tariff models tied to provisioning methods expose consumers to risks of opaque pricing, unfair cost burdens, and inconsistent service quality. A forward-looking regulatory framework should:

- **Mitigate consumer risks** by shifting to technology-neutral tariffs that focus on bandwidth capacity and service commitments (uptime, latency, packet loss, SLA guarantees), rather than legacy provisioning methods.
- **Leverage technology advancements** (SD-WAN, DWDM, Ethernet over Fibre, cloud-based DLCs) to ensure efficiency gains are reflected in tariffs, protecting consumers from inflated costs.
- **Mandate transparency** in tariff disclosures, requiring operators to publish clear cost structures and service quality parameters, preventing hidden charges or discriminatory practices.
- **Protect consumers from unfair treatment** by ensuring that choice of provisioning technology does not result in unjustified price disparities or degraded service quality.
- **Promote digital inclusion** by applying technology-neutral tariffs uniformly across regions, ensuring Tier-2/Tier-3 towns and rural areas benefit equally from modern technologies.

- **Encourage competition and innovation** by creating a level playing field where ISPs and NLDOs can adopt diverse technologies without regulatory bias, expanding consumer choice and reducing risks of monopolistic pricing.

1. Consumer Benefits :

1.1 Simpler, more transparent pricing and fewer "technology-label ambiguities"

A technology-neutral tariff model—anchored to **bandwidth and service commitments** rather than whether a circuit is delivered via P2P, MPLS-VPN, Ethernet, DWDM, etc.—can materially improve transparency for enterprises and SMEs. This aligns with TRAI's stated objectives in the current DLC review: **promoting transparency and competition** and enabling **equitable and affordable access**.

1.2 Better value-for-money by linking tariffs to outcomes (QoS, uptime, restoration)

When tariffs are explicitly linked to measurable outcomes (e.g., **availability, restoration time, latency/jitter class where offered, provisioning timelines**), buyers can compare offerings on "what they get" rather than "how it is built." This can improve service quality and reliability because:

- suppliers compete on SLA performance (not only price), and
- customers can enforce service credits/penalties for under-delivery.

1.3 Cost-flow to end consumers through stronger downstream competition

For many ISP-B/ISP-C and SME providers, wholesale transmission costs

and certainty of service are key inputs. If technology-neutral tariffs reduce hidden charges and improve comparability, they can lower effective OPEX volatility and facilitate **capacity scaling**. In competitive markets, these gains tend to translate into (i) lower enterprise connectivity costs and (ii) improved broadband quality/affordability via healthier ISP competition—consistent with the purpose of TRAI's review to update ceilings with market/technology changes and improve competitive conditions.

2. Consumer Risks and Side Effects :

2.1 Risk: Under-provisioning or "quality dilution" under a broad technology-neutral label

If a tariff is neutral to delivery technology but **does not enforce minimum performance**, providers may meet bandwidth "on paper" while delivering inferior latency/jitter, higher contention, or weaker redundancy—especially for "assured" enterprise use.

Mitigation: define **minimum service classes** with audited KPIs (availability, MTTR/restoration, provisioning time, packet loss/latency bands where applicable) and mandatory service credits.

2.2 Risk: "Technology neutrality" used to justify premium pricing without proportional performance

Providers may price "premium" offerings but fail to demonstrate objective superiority.

Mitigation: premium pricing should be permitted only when linked to **higher SLA tiers** (e.g., 99.9% vs 99.5% availability; 4-hour vs 12-hour restoration; protected vs unprotected paths), with transparent evidence and reporting.

2.3 Risk to ISP-B/ISP-C: cost asymmetries masked by bundling

If the model is neutral but allows bundling of: local lead/access + port + transport + management + overlay, wholesale buyers may face opaque effective rates and discrimination by discounting practices.

Mitigation: mandatory **unbundling + published reference offers + non-discrimination rules**, with periodic benchmarking and compliance reporting—consistent with TRAI's stated transparency and competition objectives.

3. Rationale for Technology-Neutral Tariff Models

3.1 Why technology-specific tariffing is becoming less representative of costs

Modern DLC delivery increasingly uses **multi-layer integration (packet-optical), automation, virtualisation, and Ethernet/IP service models**, and the same "service outcome" can be delivered using different architectures. As a result, tariffs that depend on labels (P2P vs MPLS-VPN; DWDM vs Ethernet over fibre) can drift away from cost causation and become arbitrage-prone.

3.2 TRAI's consultation itself positions the review around technology evolution and market change

The current consultation explicitly asks whether TRAI should consider **technology-neutral tariff models focused on bandwidth and service commitments**, indicating that technology-label ceilings may be losing relevance.

3.3 Innovation-compatibility

A technology-neutral approach reduces the risk that regulation "freezes" legacy architectures by allowing operators to innovate (automation, SDN, packet-optical, open access models) while being held accountable to consumer-relevant outcomes.

4. Forward-Looking Perspective with Technology Advancements :

4.1 Why outcome-based tariffing fits the next network cycle

Emerging directions—**virtualised transport, cloud-native routing, 5G backhaul fibreisation, network slicing concepts, open-access fibre**—increasingly separate "underlay resources" from "service behaviour." An outcome-based model (bandwidth + SLA tier) stays valid even as the underlay changes.

4.2 Future-proof regulatory approach

Adopt a **two-part framework**:

- **Service-Outcome Regulation:** regulated classes defined by bandwidth and SLA tiers (technology-neutral).
- **Component Transparency & Bottleneck Discipline:** unbundled charges for access/local lead/ports/transport, with stronger controls where competition is weak.

This matches the consultation's stated intent to align ceilings with evolving technology and market realities.

5. Industry Change and Market Dynamics

5.1 Market shifts make comparability and predictability more important: Enterprise connectivity demand is being reshaped by **cloud adoption and distributed applications**, increasing sensitivity to latency, uptime, and restoration time—not merely headline bandwidth. In such markets, "technology-label" tariffs are less informative than "service-commitment" tariffs.

5.2 Competition and entry-barrier implications (ISP-B/ISP-C)

Technology-neutral tariffs can reduce entry barriers if they:

- prevent opaque bundling,
- standardise wholesale products, and
- ensure non-discriminatory access/discounting.
  This is directly aligned with TRAI's competition and transparency objectives for the DLC market.

6. Criteria for a Technology-Neutral Tariff Framework :

Below are **criteria** TRAI could adopt to operationalise a technology-neutral ceiling/benchmark framework:

6.1 Bandwidth-tiered structure (core price axis)

- Define standard tiers (e.g., 10/50/100/200/500 Mbps; 1/2/5/10 Gbps).
- Require scalability rules (upgrade/downgrade charges, provisioning timelines).

6.2 SLA/QoS-tiered "service classes" (value axis)

Minimum mandatory disclosure and enforceability for each class:

- **Availability** (e.g., 99.5 / 99.9 / 99.95)
- **Restoration/MTTR** (e.g., 4h / 8h / 24h)
- **Provisioning time** (standard vs expedited)
- **Performance metrics** where relevant (latency/jitter/packet loss ranges, especially for assured services)
- **Service credits/penalties** linked to KPI breaches

6.3 Technology-neutral but performance-specific obligations

- "Protected" vs "unprotected" class (path diversity / redundancy requirement) where premium SLAs are claimed.
- Clear rules for planned maintenance windows and notification.

6.4 Unbundling and wholesale transparency (non-negotiable foundation)

- Publish and bill separately: **access/local lead**, **port**, **transport/core**, **protection**, and any **managed/overlay** components.
- Publish discount principles (volume/term) and ensure **non-discriminatory** availability across similarly placed buyers.

6.5 Cost-based ceilings or benchmark ranges independent of underlying technology

- Set **benchmark ranges** for each bandwidth+SLA class using cost models/benchmarks; allow pricing flexibility within bands to preserve investment incentives.
- Apply stronger ceilings where competition is limited; lighter touch where effective competition exists.

6.6 Periodic review linked to cost curves and market evidence

- Review every 2–3 years (or trigger-based) to reflect falling unit costs from optical/automation and evolving demand—explicitly consistent with the consultation's purpose of updating ceilings with market and technological change.

6.7 Rural/remote and last-mile ISP provisions

- Separate benchmark for **local lead/access in low-competition areas**; prevent excessive mark-ups.
- Consider targeted incentives/discounted benchmark ranges for rural enterprise connectivity and wholesale backhaul needed by ISP-B/ISP-C.

7. Justification :

7.1 Why "Yes"—technology-neutral outcome-based models are a credible alternative :

TRAI has explicitly posed this option in the current consultation (Q7), and the stated goal of the overall exercise is to update the ceiling tariff framework with **current market conditions and technological advancements**, promoting **transparency, competition, and equitable affordability**. An outcome-based model directly serves those ends by improving comparability and preventing technology-label arbitrage.

7.2 Why criteria must be strict on performance and transparency

Technology neutrality without enforceable SLAs risks under-delivery; neutrality without unbundling risks opaque wholesale pricing and discrimination—particularly harmful for ISP-B/ISP-C and SMEs. Therefore,

minimum SLA classes + unbundled reference products + periodic review are essential safeguards to keep the model consumer-first while preserving operator sustainability.

Conclusion:

Yes, the Authority should consider a **technology-neutral tariff model** as an alternative approach, provided it is anchored to **bandwidth + SLA/QoS service commitments**, supported by **mandatory unbundling and non-discrimination**, and maintained through **periodic cost-curve-linked reviews**. This approach is best aligned with TRAI's objectives of transparency, competition and equitable affordability, while remaining robust as networks evolve toward software-defined, automated and cloud-integrated architectures.

Q8: What are the various service commitments (such as bandwidth, SLA requirements such as uptime, latency, packet loss, response time etc.) bundled as part of managed DLC service, for both P2P & VPN based DLC? How are the service commitments offered as part of managed DLC services linked with the tariffs? Please provide your response with justification.

Comments :

Consumers increasingly demand not just connectivity, but reliable performance. Tariffs that are disconnected from service quality expose consumers to risks of paying for substandard services. A forward-looking regulatory framework should:

- **Mandate linkage between tariffs and service commitments** (uptime, latency, packet loss, SLA guarantees), ensuring consumers pay for measurable reliability rather than arbitrary charges.
- **Incorporate technology advancements** (SD-WAN, DWDM, Ethernet over Fibre, cloud-based DLCs) that enable better monitoring and delivery of service quality, so tariffs reflect actual performance capabilities.
- **Ensure transparency in tariff disclosures**, requiring operators to publish clear SLA parameters alongside pricing, preventing hidden risks and opaque practices.
- **Address consumer risks** by protecting against poor service delivery, unfair billing, and lack of accountability when commitments are not met. Penalties or compensation mechanisms should be built into the framework.
- **Promote digital inclusion** by ensuring that service-linked tariffs apply uniformly across regions, so consumers in Tier-2/Tier-3 towns and rural areas are not disadvantaged by lower-quality services at higher costs.
- **Encourage competition and innovation** by rewarding providers who adopt advanced technologies and deliver superior service quality, thereby driving consumer welfare and trust.

1. Consumer Benefits :

1.1 Clear service commitments improve reliability and predictability
Managed DLCs are purchased primarily for *assured performance*—not just connectivity. Explicit commitments on **committed bandwidth (CIR), availability/uptime, restoration time (MTTR), latency, jitter and packet**

loss reduce uncertainty for enterprises and SMEs, and improve continuity for consumer-facing services that depend on enterprise networks (payments, retail billing, hospital systems, logistics). TRAI's current consultation recognises the evolution of DLCs into **managed services with customer-centric contractual models** and explicitly asks stakeholders to identify these commitments and their linkage with tariffs.

1.2 Transparent SLA-linked tariffs improve comparability and value-for-money

When an operator clearly maps *each SLA tier* to a tariff (and publishes how credits apply), buyers can compare offerings, avoid hidden charges, and select a product aligned to business needs. Industry materials aimed at business customers consistently highlight **uptime, latency, packet loss and MTTR/response** as core SLA metrics.

1.3 Indirect benefits to end-users through better ISP competition and network quality

For many ISP-B/ISP-C operators and managed service providers, DLCs are a key input cost for backhaul and enterprise service delivery. If SLA-tariff mapping is transparent and non-discriminatory, smaller providers can plan capacity and compete more effectively—supporting wider coverage and better broadband quality/affordability in competitive markets.

2. Consumer Risks and Side Effects :

2.1 Risk: SLA "over-promising" and weak enforceability : Providers may market high uptime/low latency but apply narrow measurement rules or exclusions (e.g., maintenance windows, customer-premise exclusions), reducing consumer benefit.

Mitigation: standardised definitions for availability calculation, measurement points, exclusions, and mandatory service credits.

2.2 Risk: Tariff inflation through premium SLA bundling : Premium commitments (e.g., very high availability, fast restoration) can increase tariffs, and bundling can obscure whether the incremental price is justified.
Mitigation: require published **SLA-to-tariff mapping**, itemised charges, and benchmarking/ceilings for core commitments.

2.3 Risk to ISP-B/ISP-C: opaque or discriminatory wholesale SLA pricing: If wholesale managed DLC pricing bundles "underlay + SLA + monitoring + protection" without transparency, smaller ISPs may face higher effective OPEX and reduced competitiveness.
Mitigation: non-discrimination obligations, reference offers, and disclosure of discount principles and SLA tiers for wholesale buyers.

3. Service Commitments in Managed DLC (P2P & VPN)

Below are the **typical** commitments bundled in managed DLC offerings in India, grouped by service type.

3.1 Managed P2P DLC (Point-to-Point) — typical commitments

A. Bandwidth / throughput

- **Committed Information Rate (CIR):** dedicated symmetrical bandwidth (often marketed as "assured 1:1")
- Optional: burst capability (EIR) where offered

B. Availability and restoration

- **Uptime/availability commitment** (commonly “enterprise grade” such as 99.5%+; many providers position leased lines as ~99.9% or higher offerings)
- **MTTR / restoration time** and **fault response time** (business SLA discussions commonly cite response windows from minutes to hours and resolution from a few hours to a day)
- Planned maintenance rules (notice period; allowed windows)

C. Performance metrics

- **Latency** (often measured within a provider network / between PoPs)
- **Packet loss** (commonly a % threshold; GeM SOW examples use <1% in some enterprise contexts)
- **Jitter** (increasingly included, particularly for voice/video and real-time apps)

D. Operational/managed components

- 24x7 monitoring/NOC support, proactive alerts
- Performance reporting (interface utilisation, bandwidth reports)
- Optional DDoS protection/security add-ons (often packaged with business ILL)

Why P2P DLC SLAs look like this: P2P is typically designed for **deterministic routing / dedicated path characteristics**, so the SLA focus is on *availability, restoration, and performance consistency*.

3.2 Managed VPN-based DLC (typically MPLS VPN) — typical commitments

A. Multi-site connectivity and scalability

- Ability to connect many sites (hub-and-spoke, any-to-any)
- Site add/change turn-up commitments

B. Class of service (CoS) / traffic management commitments

- CoS tiers (e.g., voice/video/data classes) with differentiated performance objectives (latency/jitter/loss ranges per class)

C. Availability and restoration

- Network availability/uptime for VPN service (core + access components)
- MTTR/restoration and response time commitments (often with tiering by site criticality)

D. Performance metrics

- **Latency, jitter, packet loss / packet drop** commitments are commonly marketed for MPLS offerings in India.
- Performance reporting (bandwidth utilisation, interface metrics)

Why VPN SLAs look like this: VPNs run over a **shared core** with policy/QoS controls, so SLA design often emphasises **service classes, end-to-end performance objectives, and multi-site assurance**, rather than just "dedicated pipe" attributes.

4. How Service Commitments Influence Tariffs

4.1 The core economic linkage: tighter SLA = higher cost to serve

Stricter commitments increase **CAPEX and OPEX**, which typically justifies higher tariff bands:

- **Higher assured bandwidth (CIR)** → more capacity reservation, lower oversubscription tolerance, higher backbone and access provisioning cost.
- **Higher availability (e.g., 99.9% vs 99.5%)** → redundancy (dual access, diverse paths), better spares, higher maintenance intensity.
- **Lower latency / lower packet loss / low jitter** → better route engineering, lower congestion thresholds, higher-grade transport, QoS policing, more monitoring.
- **Faster restoration/MTTR** → 24x7 field readiness, spares logistics, more NOC staffing, and tighter escalation.

This "SLA-cost linkage" is explicitly reflected in industry guidance to business customers: higher SLA requirements (uptime/latency/repair) generally raise leased line prices.

4.2 How tariffs are commonly structured against SLA commitments (observed market patterns)

In practice, managed DLC tariffs tend to be "stacked" using adders:

1. **Base transport price** (bandwidth tier + access/local lead)
2. **SLA tier premium** (availability/MTTR class)
3. **Performance class premium** (latency/jitter/loss class; especially for VPN CoS tiers)
4. **Resilience premium** (protected path / dual last-mile / diverse routing)

5. **Managed services premium** (monitoring, reporting portal, security/DDoS, CPE management)

Evidence that Indian providers position tariffs with explicit performance/SLA commitments is visible in product disclosures (e.g., MPLS/ILL pages noting committed SLAs on uptime/latency/jitter/packet loss).

4.3 P2P vs VPN tariff mapping differences

- **P2P DLC:** premium often driven by **route diversity/protection + MTTR + dedicated bandwidth**.
- **VPN DLC:** premium often driven by **CoS tiers + multi-site scale + end-to-end performance objectives + managed overlay** (and per-site access).

5. Forward Looking Perspective with Technology Advancements

5.1 SD-WAN and automation change what is "managed" : As SD-WAN overlays, virtualised routing, and automated assurance mature, more SLA delivery becomes **software-assisted** (dynamic path selection, faster provisioning, predictive faulting). This can reduce OPEX per service, but also increases bundling risk (overlay + underlay + security). The consultation itself frames DLC evolution as increasingly managed and customer-centric, suggesting regulation should keep pace with these models.

5.2 Future-proof regulatory approach

Move toward **technology-neutral but performance-specific** SLA classes, with mandatory transparency of what portion of tariff corresponds to:

- underlay transport/access,
- SLA tier (availability/MTTR), and
- managed overlay (monitoring/security/orchestration).

6. Industry Change and Market Dynamics

6.1 Enterprise digitisation makes SLA-based tariff models more important

Multi-cloud adoption and distributed applications increase sensitivity to latency, packet loss, and restoration times—not only headline bandwidth. This drives demand for SLA-based pricing.

6.2 Competition and entry barriers (ISP-B/ISP-C)

Where managed DLCs become the default enterprise input, opaque SLA pricing can become a competitive bottleneck. Transparent, standardised SLA tiers can reduce entry barriers for smaller providers and improve competitive outcomes—consistent with the objectives TRAI highlights for the DLC review (transparency, competition, equitable affordability).

7. Regulatory Recommendations :

1. **Standardised SLA definitions across operators**

- Uniform definitions for: availability window, measurement points (CE-CE vs PoP-PoP), planned maintenance exclusions, MTTR/response, latency/loss/jitter measurement methods.

2. **Transparent tariff-SLA mapping for P2P and VPN DLCs**

- Mandatory publication of rate cards by **bandwidth tier × SLA tier × (protected/unprotected)**, and for VPN additionally **CoS tier**.

3. **Unbundling of components (especially for managed VPN/SD-WAN bundles)**

- Separate billing for: access/local lead, port/bandwidth, SLA tier premium, resilience premium, managed overlay/security/CPE.

4. **Cost-based benchmark ranges / ceilings for SLA tiers**

- Apply ceilings/benchmarks primarily to bottleneck components (access/local lead, base transport), with structured ranges for premium SLA tiers.

5. **Technology-neutral but performance-specific tariff principles**

- Allow any technology, but require that a claimed service class meets the defined KPIs (with audits and credits).

6. **Periodic review aligned with cost curves**

- Review SLA tier benchmarks every 2–3 years to ensure that efficiency gains (optical upgrades, automation) are reflected.

7. **Rural/remote provisions for enterprises and last-mile ISPs**

- Special transparency controls on local lead, restoration commitments, and resilience options in low-competition geographies.

8. Justification :

- TRAI's consultation explicitly treats the managed-service dimension of DLCs as central and asks stakeholders to identify **service**

commitments (bandwidth/SLA metrics) and their linkage with tariffs, indicating regulatory relevance.

- Provider disclosures and enterprise procurement benchmarks demonstrate that **uptime, latency, jitter, packet loss, MTTR/response, and reporting/monitoring** are now mainstream managed DLC commitments, and these are used to differentiate offerings.
- Business-focused guidance consistently links **higher SLA stringency to higher prices**, supporting a cost-causation rationale for SLA-tiered tariffs—provided definitions are standardised and enforceable.

Conclusion:

Managed DLC services in India—both P2P and VPN-based—typically bundle commitments on **assured bandwidth (CIR), availability/uptime, MTTR/restoration and response times, and performance metrics such as latency, packet loss and jitter**, often alongside monitoring/reporting and optional security/resilience. These commitments are commonly reflected in tariffs through **bandwidth tiers plus SLA-tier and resilience adders**, and for VPNs additionally through **class-of-service tiers**. A consumer-first regulatory approach should therefore mandate **standardised SLA definitions, transparent tariff-SLA mapping, component unbundling, and periodic benchmarking**, ensuring that premium pricing is justified by objectively higher, enforceable performance outcomes.

Q9: Should the proposed regulation include staggered tariffs in line with service commitments, possibly further staggered for different regions, for both VPN & P2P based DLC? If yes, what are the service commitments, mentioned as reply to Q8, which should be considered for tariff regulation?

Comments :

Staggered tariffs can play a crucial role in balancing affordability, service quality, and equitable access. A forward-looking regulatory framework should:

- **Introduce staggered tariffs linked to service commitments** (uptime, latency, packet loss, SLA guarantees), ensuring consumers pay proportionally for the level of reliability they receive.
- **Leverage technology advancements** (SD-WAN, DWDM, Ethernet over Fibre, cloud-based DLCs) to deliver scalable, cost-efficient services, with tariffs reflecting these efficiencies across regions.
- **Ensure transparency in tariff structures**, requiring operators to publish clear regional pricing and service quality parameters, preventing hidden costs or discriminatory practices.
- **Address consumer risks** by protecting against situations where rural or Tier-2/Tier-3 consumers pay higher tariffs for lower-quality services. Safeguards should mandate fair pricing aligned with actual service delivery.
- **Promote digital inclusion** by making DLCs affordable in underserved regions, thereby supporting SMEs, institutions, and consumers outside urban centers.

- **Encourage competition and innovation** by rewarding providers who adopt advanced technologies and deliver superior service quality at fair tariffs, driving consumer trust and market efficiency.

1. Consumer Benefits :

1.1 Greater transparency, affordability, and choice through SLA-linked staggered tariffs

Including **staggered tariffs aligned to service commitments** (bandwidth + measurable SLA/QoS) makes managed DLC pricing easier to compare and reduces "one-price-fits-all" ambiguity. This directly supports TRAI's stated objectives in the ongoing DLC review—**transparency, competition, and equitable/affordable access**—because buyers can see what they pay *for a defined outcome*, not for a loosely described "managed" product.

1.2 Improved service quality because price is tied to performance outcomes

When a tariff tier is explicitly linked to **availability/uptime, restoration time, latency/packet loss/jitter targets (where applicable), and monitoring/reporting**, operators have stronger incentives to engineer and maintain networks to meet the tier. This improves reliability for enterprises and for consumer-facing services that depend on enterprise connectivity.

1.3 Region-specific tiers can support rural/remote affordability by reflecting cost realities

Regional differentiation can be justified because **cost drivers vary sharply** by geography (local lead length, fibre availability, redundancy options, fault restoration logistics, competition intensity). Carefully designed regional tiers can prevent rural areas from being either (i) overcharged due to

monopoly local lead pricing, or (ii) under-served because a uniform low ceiling is not viable for providers. This aligns with the consultation's equity objective—*affordable and equitable access*—if paired with transparency and safeguards.

Cost-flow to end users: lower and more predictable wholesale transmission + enforceable service levels → stronger ISP-B/ISP-C viability and competition → better retail quality/coverage and downward pressure on broadband prices in competitive markets.

2. Consumer Risks and Side Effects :

2.1 Risk: tariff complexity and consumer confusion

Too many tiers (bandwidth × SLA × region × add-ons) can make comparisons harder and create disputes.

Mitigation: limit to a small number of standardised SLA tiers (e.g., Basic/Enhanced/Premium), publish a single reference tariff grid per region, and mandate clear disclosure of what each tier includes/excludes (measurement points, maintenance windows).

2.2 Risk: misuse of SLA tiers / premium inflation

Operators may label a tier "premium" and charge more without delivering proportional improvements.

Mitigation: standardised definitions, mandatory performance reporting, and automatic service credits/penalties for breaches—so premium pricing is allowed only when premium outcomes are delivered.

2.3 Risk to ISP-B/ISP-C: discriminatory or opaque wholesale SLA pricing across regions

Region-based pricing can be misused to impose excessive mark-ups in low-competition areas or selectively disadvantage smaller buyers.

Mitigation: non-discrimination rules, published reference offers, disclosure of discount principles, and periodic benchmarking—consistent with TRAI's transparency/competition goals.

3. Rationale for Staggered Tariffs Based on Service Commitments

3.1 Why service commitments should drive tariff tiers (cost causation)

Stricter commitments generally increase **CAPEX + OPEX**:

- Higher **committed bandwidth (CIR)** → more capacity reservation, lower congestion tolerance.
- Higher **availability** → redundancy (diverse routes/dual access), higher maintenance intensity.
- Faster **restoration/MTTR and response time** → 24×7 readiness, spares logistics, more NOC/field resources.
- Lower **latency/packet loss/jitter** (where committed) → tighter traffic engineering, higher-grade transport, proactive monitoring.

Staggered tariffs are therefore economically rational and reduce cross-subsidisation between "basic" and "premium" customers.

3.2 Why P2P and VPN need differentiated tier design

- **P2P DLC**: costs are driven more by *dedicated capacity, route engineering, local lead, protection/diversity*. SLAs focus on availability/MTTR and consistent performance on a defined path.
- **VPN (MPLS-type) DLC**: costs include *multi-site scaling, class-of-service/QoS management, shared core utilisation, management overhead*. SLAs often include CoS tiers and end-to-end performance classes.

Therefore, the same SLA tier names may apply, but **the SLA parameters and measurement points should be tailored** by service type.

3.3 Why region-specific tiers can be justified

Regional tiering reflects differences in:

- **access/local lead costs** and fibre availability,
- **restoration logistics** (repair times in remote areas),
- **redundancy feasibility** (availability of alternate routes),
- **competition intensity** (risk of monopoly pricing).

A region-tier model should be used to *improve equity and realism*, not to permit opaque price discrimination.

4. Forward-Looking Perspective with Technology Advancements

TRAI's consultation itself recognises that tariffs must remain relevant as technology and service models evolve. **Implications for tier design:**

- **SD-WAN, virtualised transport, automation** reduce provisioning and change-management costs, but can increase bundling risk; hence unbundling + outcome-based tiers remain critical.
- **5G backhaul and fibre densification** will increase demand for assured transport; SLA-based tiers help allocate scarce "high assurance" resources efficiently.
- A **technology-neutral but performance-specific** tier framework (bandwidth + SLA outcomes) stays stable even when underlying delivery shifts (packet-optical, OTN, cloud routing).

5. Industry Change and Market Dynamics

5.1 Why SLA-based differentiation is becoming more important

With multi-cloud adoption, real-time applications, and DPI-enabled services, enterprises increasingly buy connectivity based on **assurance metrics**, not only bandwidth. This pushes the market toward "managed DLC" models, making SLA-tariff mapping central to consumer welfare.

5.2 How region-specific tiers can reduce entry barriers and support equitable growth

If regional tiers are transparent and non-discriminatory, they can:

- make rural pricing more predictable for **ISP-B/ISP-C** backhaul planning,
- enable viable SME connectivity offers outside metros,
- reduce the "local lead shock" that often blocks expansion.

5.3 Implications for ISP-B/ISP-C

Small ISPs are most exposed to wholesale circuit terms. Staggered,

published SLA-tariff grids (with regional clarity) reduce uncertainty and help them compete—aligning with consultation objectives around competition and transparency.

6. Service Commitments to Consider for Tariff Regulation (as per Q8)

If staggered tariffs are adopted, the following **standardised commitments** should be used as tariff axes (with separate templates for P2P and VPN):

1. **Bandwidth assurance**

- CIR (committed) vs CIR + optional burst (EIR), symmetry, upgrade increments.

2. **Availability / uptime**

- Standard tiers (illustrative): **99.5% / 99.9% / 99.95–99.99%**
- Define measurement window, exclusions, and calculation method.

3. **Restoration / MTTR and fault response**

- Response time (acknowledgement/escalation) + restoration time (service-impact resolution).
- Separate “protected” vs “unprotected” service variants.

4. **Latency (where committed)**

- Define scope (within operator network / PoP-to-PoP / site-to-site) and measurement method.
- For VPN: allow latency targets by CoS tier.

5. **Packet loss (where committed)**

- Threshold % and measurement intervals; class-based targets for VPN.

6. **Jitter (where relevant)**

- Especially for real-time applications; often paired with CoS in VPN.

7. **Redundancy / resilience architecture**

- Single vs dual last-mile, diverse routing, protection switching, backup path obligations.

8. **Monitoring, reporting, and managed operations**

- 24×7 monitoring, proactive alerts, periodic performance reports, customer portal.

9. **Security / traffic engineering features (especially VPN)**

- CoS tiers, segmentation/VRFs, optional managed security add-ons (must be unbundled from base transport for transparency).

Important design rule: tariffs should be set primarily on **(bandwidth × SLA tier × protection level × region)**; managed add-ons should be priced separately to avoid opacity.

7. Justification (Balanced, Evidence-Linked, Consumer-First)

7.1 Should regulation include staggered tariffs?

Yes—provided the tiers are standardised, measurable, and enforceable. Staggering tariffs by service commitments directly supports TRAI's core goals in the DLC review—**transparency, competition, and**

equitable affordability—because it makes "managed DLC" comparable across providers and ensures premiums are paid only for defined performance.

7.2 Should it be further staggered by region?

Yes, but only with safeguards. Region-specific tiers can reflect genuine cost differences and improve rural viability, but must be constrained by:

- published reference offers and non-discrimination,
- clear local-lead/access component rules,
- periodic benchmarking/review to prevent rent extraction in low-competition areas.

7.3 Which commitments should be regulated?

At minimum, regulate or benchmark the commitments that most strongly drive cost and consumer outcomes:

- **CIR bandwidth**,
- **availability/uptime**,
- **restoration/MTTR + response time**,
- **protection/diversity (redundancy)**,
- and (where explicitly offered) **latency/packet loss/jitter** with standard measurement definitions.

Conclusion:

A staggered tariff framework—tiered by **bandwidth and clearly defined SLA commitments**, and optionally differentiated by **region**—is a practical, consumer-first approach for both P2P and VPN-based DLCs, so long as it is implemented through **standardised SLA definitions, transparent tariff-**

SLA mapping, non-discrimination obligations, and periodic reviews to keep tiers aligned with evolving cost curves and service realities.

Q10: What reporting mechanisms should be mandated to ensure transparency in discounts and service bundling for DLCs? Please provide your response with justification.

Comments : No Comments.

Q11: Should the Authority mandate standardized tariff disclosure formats for all DLC service providers? Please provide your response with justification.

Comments : No Comments.

Q12: Should TRAI use the same cost methodology i.e. BU-FAC for computing cost based ceiling tariffs for P2P DLCs as was used in 2014? Please provide your response with justification.

Comments : No Comments.

Q13: In case response to the above question is affirmative, what values of the following items should be used for estimation of ceiling tariffs for DLCs:

(i) Return of Capital Employed (ROCE) 57

(ii) Telecom Regulatory Authority of India Useful lives of transmission equipment and Optical Fibre Cable separately

(iii) (iv) (v) (vi) (vii) Average no. of fibre pairs lit in OFC in trunk segment and local lead segment separately Utilization factor of OFC system in trunk segment and local lead segment separately % of use for the transmission equipments used at local lead junction points and in trunk

segment for DLCs If the repeaters are still being used in the trunk segment, what is the average distance between two repeater sites? What is the factor of use (no. of circuits in underlying OFC system) to be taken into consideration at local lead and trunk segment for computation of ceiling tariffs?

Comments : No Comments.

Q14: As an alternative to the BU-FAC methodology, or in addition to it, should LRIC or any other methodology be considered for computing ceiling tariffs for P2P DLCs? Please support your view with detailed justification along with data and assumptions

Comments : No Comments.

Q15: What should the bandwidth capacities be, including the minimum and maximum bandwidth capacity, of P2P DLC for which ceiling tariffs need to be prescribed? In case of bandwidth capacities not regulated in the 2014 TTO, what should be the concomitant value of the relevant factors mentioned at Q13? Please provide your response with justification.

Comments : No Comments.

Q16: Should the Authority consider the cost methodologies used in other countries for determining tariffs for P2P-DLCs? If so, which methodologies would be appropriate for the present exercise? Please provide your response with justification along with data and assumptions. 58 Telecom Regulatory Authority of India

Comments : No Comments.

Q17: Is there a need for prescribing separate ceiling tariffs for local lead and trunk segment? Should the Authority adopt different cost methodology for local lead and trunk segment for provisioning of DLCs? If yes, please provide your response with justification.

Comments : No Comments.

Q18: Should the Authority adopt BU-FAC, LRIC or any other methodology for computing ceiling tariffs for VPN DLCs? Please support your view with a detailed justification along with data and assumptions.

Comments : No Comments.

Q19: What should the bandwidth capacities, including the minimum and maximum bandwidth capacity, of VPN DLC for which ceiling tariffs need to be prescribed? Please provide your response with justification.

Comments : No Comments.

Q20: Should the Authority consider the cost methodologies used in other countries for determining tariffs for VPN-DLCs? If so, which methodologies would be appropriate for the present exercise? Please provide your response with justification along with data and assumptions.

Comments : No Comments.

Q21: Should the spectrum charges recommended for a point-to-point link of 28 MHz paired bandwidth in the 6 GHz(lower) band, be taken as reference for DLC ceiling tariff? If yes, what could be the approximate order of multiple between the backhaul link charges and DLC ceiling tariff? Should the reference be considered for local lead or trunk

segment or on overall basis? Please provide your response with justification.

Comments : No Comments.

Q22: Is the distance-based pricing, based on distance slabs contained in the 2014 TTO (57th Amendment), still relevant for prescribing ceiling tariffs for P2P DLCs? Should the Authority consider new distance slabs, separately for both the local lead and trunk segments, for prescribing ceiling tariffs for P2P DLC? Please provide your response with justification.

Comments : No Comments.

Q23: Is there a need for prescribing separate ceiling tariffs for remote and hilly areas? What criteria should be used to define such regions? Please provide your response 59 with justification. Telecom Regulatory Authority of India

Comments : No Comments.

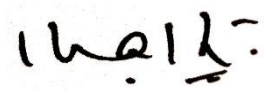
Q24: How can the Authority ensure affordability in low-competition areas, such as remote and hilly areas, without distorting market incentives? Please provide your response with justification.

Comments : No Comments.

Q25: Are there any other relevant issues related to revision of tariff framework for DLCs which the Authority should keep in mind, while carrying out the present review exercise, to further the broad objectives as espoused in this Consultation Paper? Please provide full details and justification for consideration of the same.

Comments : **No Comments.**

Thanks.



(Dr. Kashyapnath)
President