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Auto-Deletion of Unused TE Tunnels Using a Timer-Based Mechanism
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Abstract

This document describes a timer-based mechanism for handling unused Traffic Engineering (TE) tunnels.

When a tunnel remains inactive for a configured period, it is moved to a parked state, administratively shut down, and the associated resources are released.

If the tunnel remains parked beyond a longer retention interval, it may be deleted automatically or removed through operator action, depending on local policy.

This approach improves resource utilization and provides a structured lifecycle for unused TE tunnels.

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

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1. Introduction

Traffic Engineering (TE) tunnels are widely used in transport and IP/MPLS networks to steer traffic and provide deterministic forwarding behavior. Common examples include RSVP-TE tunnels, described in [RFC3209], and Segment Routing Traffic Engineering (SR-TE) policies, which build on Segment Routing concepts described in [RFC8402] and are specified in [RFC9256].

Over time, some TE tunnels become inactive but remain provisioned on the router. Even when they are no longer carrying traffic, such tunnels may continue to consume labels, BFD state, session state, memory, and other operational resources.

This document describes a mechanism to manage unused TE tunnels through a parking state and a timer-based deletion policy. The mechanism is intended to improve resource efficiency while preserving operator control over tunnel lifecycle management.

2. Problem Statement

Unused TE tunnels can remain configured in the network for long periods without carrying traffic. Such tunnels may still consume forwarding state, labels, BFD sessions, system memory, and other tunnel-related resources.

The problem becomes more significant in networks containing large numbers of TP co-routed tunnels, RSVP-TE tunnels, and SR-TE tunnels. As the number of provisioned tunnels grows, manual identification and cleanup of unused tunnels becomes increasingly difficult.

A mechanism is therefore needed to identify inactive tunnels, release their associated resources in a controlled manner, and optionally delete them after extended inactivity.

3. Proposed Solution

This document proposes a two-stage lifecycle mechanism for unused TE tunnels: parking and deletion.

In the first stage, a tunnel that remains inactive for a configurable interval is moved to a parked state. When the tunnel is parked, the system administratively deactivates the tunnel and releases the associated resources. This may include BFD sessions associated with the parked tunnel, for example those defined by [RFC5880].

In the second stage, a deletion policy is applied to tunnels that remain parked for a longer retention interval. Depending on local policy, the tunnel may be deleted automatically after an alarm is raised, or retained until the operator explicitly removes it.

This approach reduces resource consumption and provides a predictable operational method for handling long-term unused TE tunnels.

4. Detailed Mechanism

4.1. Inactivity Detection and Parking

The system continuously monitors tunnel activity. A tunnel may be considered inactive when no control-plane or data-plane activity is observed for a configured period.

When the inactivity threshold is reached, the system moves the tunnel into a parked state and records the tunnel in a dedicated parking table or database.

When a tunnel is parked, the system places it in administratively shut state and releases the resources associated with that tunnel. Depending on the tunnel type, this may include labels, bandwidth-related state, BFD sessions, and protocol session state.

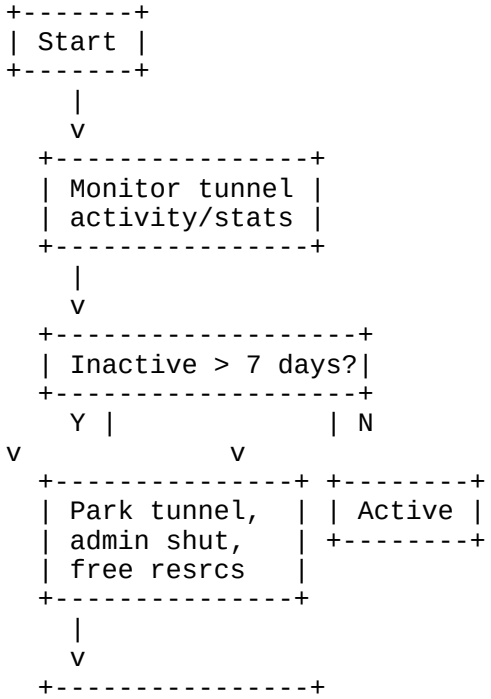
4.2. Retention and Deletion

A parked tunnel may be restored to service at any time by operator action. If the operator issues an administrative no shut command before the retention timer expires, the tunnel returns to active state.

If a tunnel remains parked beyond the configured retention interval, the system evaluates the deletion policy. In an automatic deletion mode, the system raises an alarm and then removes the tunnel after the configured grace period. In a manual deletion mode, the system raises an alarm and retains the tunnel until it is explicitly deleted by the operator.

5. Example

Figure 1 illustrates the operational flow for parking and deleting an unused TE tunnel.



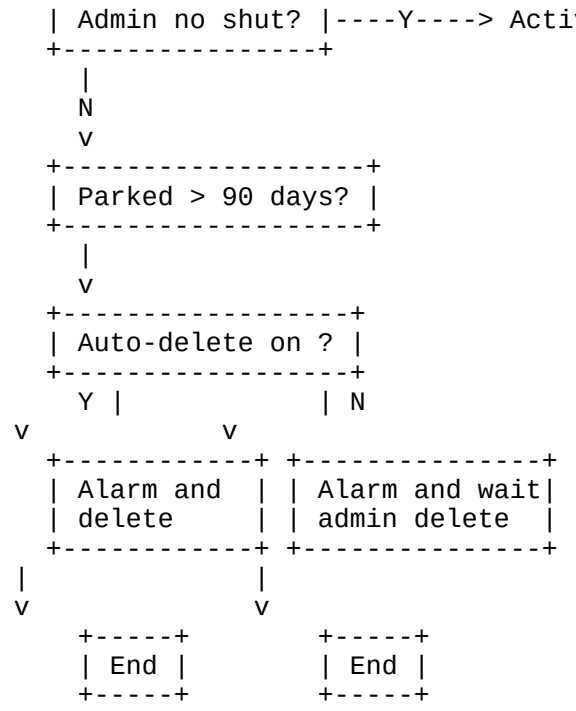


Figure 1: Operational Flow

Consider a TE tunnel T1 provisioned between PE1 and PE2. The node monitors tunnel usage to determine whether the tunnel remains active.

If T1 remains inactive for more than 7 days, the node moves the tunnel to the park table, updates the corresponding database entry, places the tunnel in administratively shut state, and releases the associated resources.

If an operator issues an administrative no shut command before the parked interval reaches 90 days, T1 returns to active service.

If T1 remains parked for more than 90 days, the node evaluates the configured deletion policy. If automatic deletion is enabled, the node generates an alarm and deletes the tunnel. Otherwise, the node generates an alarm and retains the tunnel until it is manually deleted by the operator.

The operational sequence is therefore as follows: monitor tunnel activity, park the tunnel after the inactivity threshold, allow administrative reactivation during the retention interval, and apply either automatic or manual deletion after the retention period expires.

6. Security Considerations

This document describes operational behavior that can affect tunnel availability and resource allocation. Unauthorized or incorrect administrative actions could cause active tunnels to be parked or deleted unexpectedly.

Implementations should ensure that only authorized management entities can configure inactivity thresholds, retention timers, deletion policies, or administrative reactivation and deletion actions.

Operators should also consider safeguards for alarms, audit logs, and policy review to reduce the risk of unintended tunnel removal.

7. IANA Considerations

This document has no IANA actions.

8. References

8.1. Informative References

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[RFC9256] Filsfils, C., Talaulikar, K., Ed., Voyer, D., Bogdanov, A., and P. Mattes, "Segment Routing Policy Architecture", RFC 9256, DOI 10.17487/RFC9256, July 2022, <https://www.rfc-editor.org/info/rfc9256>.

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