ORACLE
SD-WAN

How to Travel First Class on Your Network

Oracle SD-WAN solutions can deliver a first-class travel experience for data packets moving along your network.

ORACLE

Imagine every aspect of your travel experience is first class: You book the reservation with ease; the flight schedule matches your timeframe; the cost is reasonable. On the plane, you sink into a spacious, leather seat and the chair next to you is empty. After an on-time arrival, your luggage is waiting for you, along with a driver to your resort destination.

This perfect scenario is a nice dream, but rarely a reality for human travel. On the other hand, certain SD-WAN solutions that manage packets dynamically over WAN infrastructure can deliver a first-class experience for data travelling over your network.

Beyond cost savings, agility, reliability, and security, quality of experience (QoE) is a primary driver of SD-WAN deployments.

HOW TO ALWAYS TRAVEL FIRST CLASS

Edge SD-WAN appliances—either virtual or physical—are deployed at customer branch offices or remote sites for users accessing applications from corporate data centers and cloud sites. Edge devices are centrally managed by a controller that orchestrates virtual overlay tunnels over multiple network links of any type.

Beyond cost savings, agility, reliability, and security, quality of experience (QoE) is a primary driver of SD-WAN deployments. Not all SD-WANs are alike, and key differentiation is found in the details associated with QoE. All SD-WAN solutions support multiple connections, but what varies is how they use those connections, the way WAN connection problems are handled, and the time it takes to move traffic away from a problem connection.

PACKETS SHOULD RECEIVE FIRST-CLASS TREATMENT IN BOTH DIRECTIONS

Most SD-WANs include policy-based routing to predetermine paths based on bandwidth and latency assumptions. Unfortunately, actual network conditions often don't conform to predefined assumptions. The ability to combine predetermined outcome, intent, or application-level policies with microsecond knowledge of actual network performance ensures great QoE.

Some SD-WANs base path decisions on latency measured using a round-trip ping. However, round trip measurement discounts the possibility that traffic could take different routes in both directions and that each direction can vary drastically in latency, packet loss, and bandwidth. An SD-WAN that measures the loss, latency, and jitter of every path in each direction separately creates a complete and distinct network map. With this information, more intelligent path decisions can be made.

QUALITY OF EXPERIENCE ENSURES EQUIVALENT APPLICATION QUALITY WHEN MOVING LINKS

Imagine you are flying from San Francisco to Singapore. You stop in Japan for a connecting flight and move from the comfort of a Dreamliner to a cramped crop-jet that carries 14 passengers. Even though 80 percent of your trip was efficient and pleasant, your ultimate arrival will be extended due to a slow aircraft that battles strong headwinds. This scenario is not unlike the last-mile experienced by packets traveling over traditional WANs.

SD-WAN intelligent routing is intended to make better use of all available bandwidth. The most simplistic routing mimics load balancing by assigning individual sessions to a path—often without regard to link characteristics and application requirements. Somewhat more sophisticated SD-WANs

route traffic by the packet. But both approaches may result in poor application quality if traffic is moved to dissimilar links, such as from multiprotocol label switching (MPLS) to cable. Latency and bandwidth between the two will often vary widely. Packet load balancing without WAN link intelligence can result in out-of-order packets and high-loss risk. This can lead to more retransmits and performance that is actually worse than no load balancing at all.

An SD-WAN—with intelligent routing and the necessary mapping of current network conditions—is deterministic and adaptive; it spreads a single session across multiple links only when the end result will improve performance. It adapts to changing conditions and moves packets off links as quality degrades or links fail, without disrupting the session. Loss mitigation and reorder control also help compensate for dissimilar link characteristics.

An SD-WAN—with intelligent routing and the necessary mapping of current network conditions—is deterministic and adaptive; it spreads a single session across multiple links only when the end result will improve performance.

SESSION-LAYER, PATH-LAYER, AND WAN-LINK INTELLIGENCE DIRECTLY IMPACT QUALITY OF EXPERIENCE

SD-WAN solutions that only use path intelligence will detect a problem with the WAN and move packets to a better performing link. Unfortunately, when using traditional probing and routing methods, the process can cause delays that impact user sessions.

While path intelligence moves all network traffic from a failed link to a working link, it's not well-suited for moving applications that are sensitive to packet loss and network congestion. Path intelligence has no inherent application awareness to address specific characteristics and requirements for real-time apps, such as voice over internet protocol (VoIP), that need low loss and jitter. Some apps, such as file transfers, don't have such requirements and can run over the least-expensive, high-bandwidth links. Because of the delays caused by path intelligence methods, user sessions and applications can become slow and unreliable.

Session-layer intelligence monitors each session's performance and moves traffic to the best link based on application type, not unlike basic load balancing. The ability to associate packets and flows with a unique session and manage that session helps keep traffic running optimally. Because session intelligence is application-aware, it can conduct session buffering to avoid the performance problems caused by packet loss, eliminate jitter, and enable a smooth app recovery process.

One challenge associated with session intelligence is that session-level thresholds from service-level agreements (SLA) may change based on different underlying network behaviors, such as site-to-site latency.

ORACLE SD-WAN QUALITY OF SERVICE: SESSION LAYER, PATH LAYER, AND WAN LINK INTELLIGENCE

Using path-layer intelligence, Oracle SD-WAN Edge instruments and monitors every packet at the path level. By continually detecting, measuring, and analyzing the WAN path for each packet, regardless of sessions, the path can be adjusted after seeing trends in as little as two or three packets. Oracle SD-WAN Edge is able to accomplish this technique by receiving a packet on a path every few microseconds—not milliseconds.

Oracle SD-WAN Edge utilizes session-layer intelligence to buffer and monitor each session and adjust sessions according to bandwidth availability without impacting end users. Oracle SD-WAN Edge also accounts for path independence in factoring its WAN path optimization.

Oracle's WAN-link intelligence provides first- and last-mile bandwidth and congestion monitoring to provide insights into link characteristics and dynamic conditions that cause latency, jitter, and packet loss. Based on a complete understanding of link characteristics, conditions, and policies, Oracle SD-

WAN Edge enforces policies on the packet transition process and moves packets to better performing links—in a fraction of a second.

When network conditions change, Oracle SD-WAN Edge discerns those change quickly and adjusts sessions to use the network differently. Combining session layer, path layer, and WAN link intelligence with quality of service (QoS), delivers packets so that application responses are fast, secure, and reliable. With first-class travel for packets, users receive first-class experiences.

Oracle SD-WAN

Deployed globally, the Oracle SD-WAN product family provides market-leading, trusted, failsafe SD-WAN technology. It delivers superior application reliability and resiliency while unlocking the benefits of branch consolidation.

CONNECT WITH US

Call +1.800.ORACLE1 or visit oracle.com/sdwan.
Outside North America, find your local office at oracle.com/contact.

blogs.oracle.com/oracle-communications facebook.com/OracleCommunications twitter.com/OracleComms

Integrated Cloud Applications & Platform Services

Oracle is committed to developing practices and products that help protect the environment

ORACLE