

## Solutions Overview

Supplying the power of tomorrow's technologies – today.

Since 1993, Circadence® has leveraged the power of advanced technologies to pioneer smarter and faster solutions for improving IT performance. Our full line of products and technologies helps reinvent the possibilities of WAN optimization, security, and business continuity – breaking new barriers of simplicity, agility, and cost-effectiveness.

CIRCADENCE  
**MVO™ 1200**  
WAN OPTIMIZATION

CIRCADENCE  
**MVS™ 1300**  
SYSTEMS MANAGEMENT

CIRCADENCE  
**MVR™ 1400**  
ROUTE ANALYTICS



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## Circadence MVO™ 1200 Optimization Suite

### Maximize network performance from edge to edge

The Circadence MVO™ 1200 WAN Optimization suite offers many flexible deployment options including a software-only suite, virtual appliance, hardware appliance, individual user application, and modules that embed into third-party platforms and applications. Circadence MVO solutions are fully interoperable regardless of the deployment platform, and the appliance and software are both equivalent in features and functions.

**Circadence MVO Software:** The Circadence MVO Software platform runs as a service in Windows and as a daemon in Linux. Installation of the Windows platform is via a Microsoft installer, requiring limited interaction from the user, and the application is administered through a native Windows interface. The Linux platform is installed via RPM, and administered through a command line interface. The Circadence MVO Software is notable for its small size, requiring less than 5 MB when fully installed.

**Circadence MVO Virtual Appliance:** Circadence has pre-configured virtual machines utilizing the same hardened operating system as the Circadence MVO Hardware Appliance. The Circadence MVO Virtual Appliance is available off the shelf for both VMware and Xen, and the solution is easily portable to a Microsoft virtual machine (VM).

**Circadence MVO Hardware Appliance:** The Circadence MVO Hardware Appliance is a built-to-spec Intel-based server running a Circadence-customized version of Red Hat Enterprise Linux. This solution is pre-hardened to the U.S. Department of Defense (DoD) standards and accredited to handle classified data. The Circadence MVO Hardware Appliance is administered through a web-based interface.

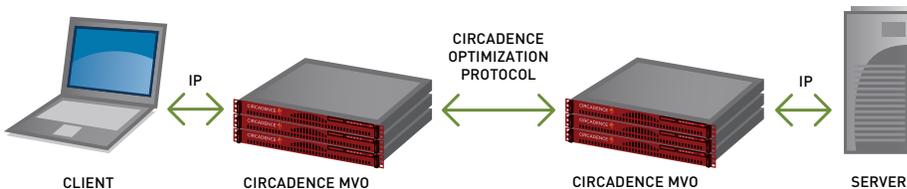
**Embedded Circadence MVO:** Circadence MVO solutions can be integrated into other applications and platforms via an application programming interface (API), leveraging the Circadence MVO Hardware Appliance in whole or Circadence's patented optimization protocol stack independently.

### Features and functions

- **Link Resilience™:** This unique Circadence technology was originally developed for the U.S. Military and enables applications to be completely insulated from momentary network outages. Link Resilience automatically mitigates disruptions lasting from milliseconds to hours. Applications resume traffic exactly where they left off as soon as the connection is restored. Circadence MVO with Link Resilience creates the most robust networked application environment.
- **Connection:** Circadence MVO solutions provide an enhanced connection across arbitrary networks between endpoints. Functionally, Circadence MVO acts as a proxy, terminating the local IP connection within the Circadence MVO process, performing additional processing (compression, de-duplication, etc.), and then transmitting the payload across the WAN using Circadence's optimization protocol. At the distant end, the payload is captured and reassembled into the original IP packet, including original header information, and sent on to the destination.

The Circadence optimization protocol creates packets that are modified user datagram protocol (UDP) packets containing an additional Circadence MVO header. The Circadence MVO process applies slow start and congestion control processes to the UDP flow, creating a reliable UDP connection. The processes for slow start and congestion control are based on a modified version of the Circadence optimization protocol Vegas model, though it is not used in the peer-to-peer connection. The Circadence protocol connections between endpoints use an arbitrary, administratively selected port.

- **Performance:** Circadence MVO is based on a notion of a core process and daughter modules. The core process performs the translation, congestion avoidance, and flow control. Daughter modules handle protocol-specific functions such as FTP sessions, HTML, UDP broadcast listeners, compression modules, cache systems, etc. Additionally, custom modules can be integrated for specific customer needs. Circadence MVO solutions provide an enhanced performance capability across the WAN through three distinct methods, which are leveraged according to traffic type, customer requirements, and needs.
- **Optimization protocol:** Circadence MVO solutions use the Circadence optimization protocol for transport across the WAN. The Circadence protocol provides an enhanced connection that mitigates the effects of congestion, latency, and fragmentation. The connection begins with a slow start process that has a variably aggressive ramp rate, letting our proprietary protocol



CIRCADENCE MVO CONNECTION FLOW

discover the real-time bandwidth limit quickly (mostly important in highly transient networks and wireless).

Furthermore, our protocol is not directly "loss based" in determining the send rate. Instead, it uses an understanding of current conditions discovered through an out-of-band, quality of service (QoS) discovery packet. That information is used to carefully meter packets onto the wire, and it enables fine changes in transfer rates to suit conditions – allowing the protocol to maintain peak throughput rates and recover more quickly from disruptions. Throughput gains are quite significant and the delta in performance increases greatly as latency, congestion, or fragmentation increase.

- **Compression:** Circadence MVO solutions utilize a fast LZO (Lempel-Ziv-Oberhumer) compression module, allowing block-based, lossless compression to be performed at wire speed. Circadence has created a decision module that determines whether or not to compress data based on speed, bypassing if compression time exceeds the benefit. Circadence MVO solutions also have CIFS/SMB modules to provide enhanced Microsoft file transfer.
- **Caching:** The Circadence MVO platform has a web cache module available based on Squid that provides a fast and reliable caching mechanism, reducing requests over the wire.
- **Custom modules:** Circadence has provided custom modules for customers with unique applications or specific requirements. Examples include a module for actively listening to UDP broadcast simulations and for sending a UDP broadcast across the WAN in a reliable and congestion-controlled manner. At the distant end, the Circadence MVO peer rebroadcasts the original stream. Additional modules include protocol translators and de-duplication systems.



## Empower virtual and physical asset management

The Circadence MVS™ 1300 Systems Management suite provides unified discovery, management, alerting, and reporting of physical and virtual assets in a single console. Circadence MVS has native interfaces for industry-standard management and reporting, as well as a highly advanced installed agent, which allows granular system control. From within the Circadence MVS suite, the administrator can discover and manage all of the enterprise's assets across multiple geographic locations and administer host systems, VMs, thin clients and hypervisors, as well as receive full reporting and alerting.

**The platform:** Circadence MVS is built on a Windows Management Instrumentation model and installs and runs as a native Windows application.

**Universal discovery:** Circadence MVS solutions provide universal discovery of managed assets, whether they are VMs, hypervisors, thin clients, blades, servers, or users and groups in the Active Directory environment. Once discovered, all these assets are managed through a single, easy-to-use console that supports views, filters, and security rights delegation.

**Virtual desktop platform management:** Circadence MVS provides management reporting alerting, and monitoring for both physical and virtual assets regardless of the VM or physical systems' manufacturer. Circadence MVS integrates into Active Directory and standalone authentication models, providing fine-grain rights and brokering management for virtual desktop infrastructure deployments, along with the ability to manage this environment cross platform with multiple VMs or hardware providers. This allows the systems manager

to choose the best systems for each element of their environment.

Circadence MVS solutions support Linux and XPe thin clients, as well as Firefox or Internet Explorer browser-based clients. All major hypervisors, including VMware ESX, Xen, and Microsoft Hyper-V, are supported – not only for connection brokering, but also through management API integration for power management, VM inventory, registration, and a variety of other hypervisor management tasks.

**Solid security model:** The Circadence MVS console supports rights-delegation and fine-grained control over which features are accessible to specific individuals. Therefore, a variety of IT roles (desktop administrators, help desk technicians, and network administrators) can use the Circadence MVS console and focus on their delegated area of competence. As the Circadence MVS platform fully integrates with Active Directory users and groups, existing user and group roles are simply imported and mapped without a secondary directory and/or rights mechanism.

**Asset management:** The Circadence MVS suite enables connection brokering and natively hooks to Active Directory. Connection brokering allows profiles to be created linking users, roles, applications, VMs, and physical devices. This solution also manages the connections according to defined policies. Circadence MVS management enables active load balancing of virtual assets across physical assets, as well as scripted behaviors based on trigger events and conditions. The Circadence MVS platform is unique in its agnostic management capabilities and flexible scripting.

## Circadence MVR™ 1400 Route Analytics Suite

### Monitor IP routing layer continuously

The Circadence MVR™ 1400 Route Analytics suite is an IP management solution that continuously monitors a network to deliver a high-fidelity Layer 3 view of the IP control plane. By listening to routing protocols and related activity, the solution reconstructs the state of the network and its service paths, providing a representation of the Layer 3 components and paths in “networktime.” The intelligence delivered by the Circadence MVR suite makes possible a preventive network management, rather than reactive. Network operators and engineers can pinpoint a variety of persistent and transient – or even invisible – problems that are difficult to diagnose with traditional management techniques and tools.

**The platform:** The Circadence MVR suite uses distributed listeners to collect routing updates, which are processed and then forwarded to a central server for analysis and path monitoring. Historical data is also persisted to a reporting server for charting and reporting. Circadence MVR solutions are deployed using network appliances along with a PC-based management console. The appliances include listeners that host the data collection software of the Circadence MVR platform, and servers to host the analytics/diagnostic software and database. The management console

is a Java-based GUI that runs as a PC application to communicate with the server appliance. Multiple management consoles can operate against a single server.

**Performance management:** Circadence MVR solutions support integration with network fault and performance monitoring tools to enable automated correlation that streamlines problem isolation for service degradation. Circadence MVR solutions can instantly identify the specific routers, router interfaces, and connections in use by any service – enabling automated correlation between a degraded service and any events on those elements. By immediately alarming on path changes, Circadence MVR solutions can be used to trigger service monitoring probes to automatically check service quality on the new path – triggering immediate support efforts in the event of a problem, rather than waiting 5 to 10 minutes for the next polling cycle.

**Service change management:** One of the leading causes of IP/MPLS service disruptions is self-inflicted – configuration errors introduced during network maintenance. The Circadence MVR platform’s ability to continuously monitor enables it to automatically detect service path changes and their root causes. As such, configuration errors can be immediately detected before leaving a maintenance window, allowing

operations to immediately correct the error and restore service before going back into full production.

**Network-time, high-fidelity view of network and paths:** Listening to all routing protocol messages allows Circadence MVR to derive and display a real-time graphical view of both the Layer 3 topology and the paths between selected source/destination pairs. This capability is completely non-disruptive to ongoing network operation and imposes no burden on routers or other network elements – in sharp contrast to Simple Network Management Protocol (SNMP)-based solutions that employ polling to extract data from network elements, placing loads on routers and impairing their performance.

**Proactive and forensic analysis of IP network problems:** The Circadence MVR platform helps enable service owners, network engineers, and operators to diagnose and resolve problems much more rapidly than previously possible.

**Customizable alerts and reports:** Circadence MVR solutions offer a comprehensive set of reports and alarms, many of them configurable by the network operator. Examples include detailed reports on availability, routing operation, and network stability, as well as comprehensive alarms that provide real-time notification directly to personnel or to other systems.

**Interface to third-party systems:** The Circadence MVR platform easily interfaces with fault and network management and other third-party systems, and fits seamlessly into existing operational environments with little need for changes to established methods and procedures.