

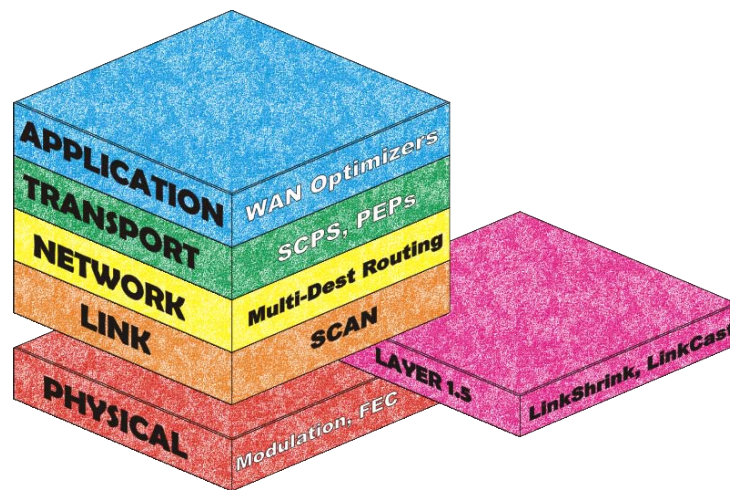


LinkIP vs WAN Optimizers

The LinkIP is a unique satellite bandwidth efficiency solution that was specifically designed for maximizing data throughput over satellite links. The LinkIP is not to be confused with WAN Optimization Controllers (WOCs), which operate primarily on the application layer of the IP stack. These WAN optimization devices, manufactured by companies such as Riverbed, Cisco, Ipanema Technologies, and Citrix, are designed to optimize data flows across Wide Area Networks that traverse multiple physical networks and can involve transporting data across numerous router hops. These appliances are designed to manage data traffic flows over a wide variety of transport media, and therefore perform their “optimization” in completely different manners and on different layers than the LinkIP solution.

IP PROTOCOL STACK

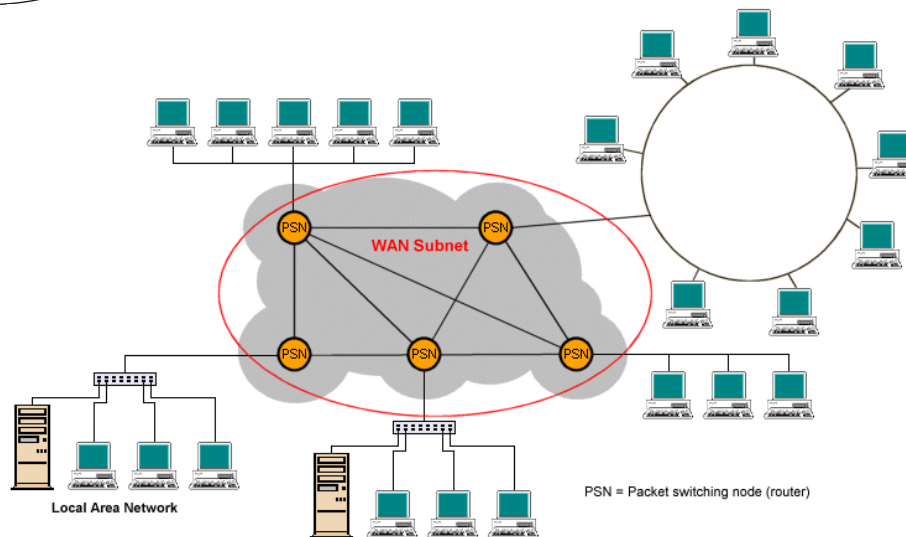
The most obvious difference between the LinkIP solution and WOCs is where the two different technologies work in the IP stack. Whereas WOCs and application accelerators operate in the application and transport layers, the LinkIP’s router operates in the network and link layers, and the LinkIP’s compression and transport (LinkShrink & LinkCast) operate between the link and physical layers (layer 1.5). Because the LinkIP is working below the application and transport layers, what the WOCs are doing is invisible to the LinkIP.



LinkIP Stack

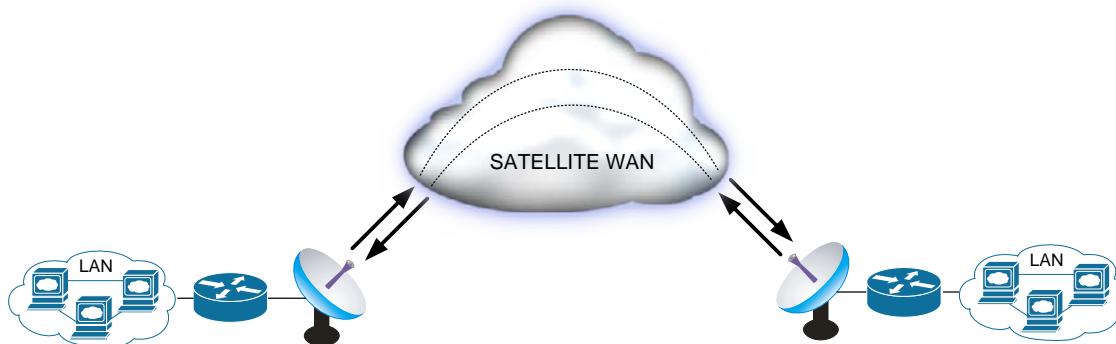
WAN CLOUD

A typical WAN consists of a “cloud” over which IP packets are transported from a source to a destination. The WAN is usually a patchwork of interconnected routers that can use several different transport media, including optical fiber, copper, coaxial cable, microwave, and satellite. Because the overall WAN in this scenario is typically not under the control of a single operator, WOCs are only able to work their bandwidth saving and acceleration “magic” at the layers that the client or service provider controls, which are the application and transport layers.



Typical Terrestrial WAN Network Diagram

Dedicated satellite WANs, however, are unique in that the “long haul” router to router transport is accomplished using point to point and point to multipoint satellite links. In most cases, the service provider / network operator controls all endpoints in the satellite WAN. Because all points in the WAN between the LAN gateway routers (i.e. the satellite and the earth stations) is controlled by the network operator, packets can be handled differently than with a typical terrestrial WAN. LinkSat has taken advantage of this fact and has devised a novel approach to streamlining traffic flowing across the satellite WAN. A typical IP satellite remote site has a LAN-to-WAN router which connects the local network to the satellite modems. Each LAN-to-LAN IP route in the network has a dedicated point to point duplex satellite link.



Typical Satellite WAN Diagram

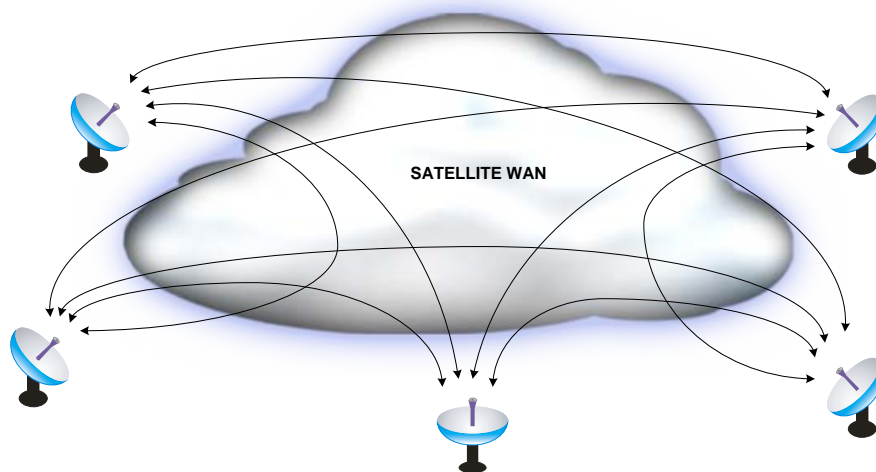
Transport of IP data over satellite presents some unique challenges versus transporting IP over a standard terrestrial network. In the above scenario using the traditional way of transporting IP over a satellite WAN, the LAN gateway routers are treating the satellite WAN as if it's a typical WAN and not a point to point connection. To overcome the fact that the satellite itself



cannot route packets, each IP route requires its own SCPC circuit. This approach is highly inefficient and costly, considering the high cost of satellite bandwidth. LinkSat takes a different approach to streamlining data flow in this environment. The LinkIP utilizes a highly customized router designed to route packets over the satellite WAN as if the satellite were an Ethernet switch.

The LinkIP has several streamlining tools that take advantage of the unique aspects of satellite.

1. **Advanced LAN to WAN router** – a specially equipped router that takes the place of the standard gateway router at a remote earth station site
2. **LinkShrink compression** – high efficiency lossless data compression engine that is protocol independent
3. **LinkCast over-the-air transport protocol** – a high efficiency proprietary transport encapsulation system designed specifically for dynamically routable IP over satellite
4. **Routed Multi-Destination (RMD)** – a full-mesh dynamic routing over satellite capability



LinkIP Routing - "Ethernet switch in the sky"

The LinkIP essentially turns the satellite into an Ethernet switch in the sky, allowing for high efficiency full mesh dynamic routing. No other solution or optimization technology has this unique capability.

CONCLUSION

The LinkIP cannot be compared directly to WOCs because it operates on different layers and performs different functions than the WOCs. Because the LinkIP was designed specifically for satellite WAN networking, it is superior to any other "optimization" solution available in terms of data throughput performance, bandwidth efficiency, and cost effectiveness. More information on the LinkIP can be obtained at www.linksat.com.