Software Defined Networks
Technology Briefing

Software Defined Networks (SDNs) use vendor-neutral open protocols to provision services across different types of commonly used switches and routers. Abstracting the proprietary nature of the network infrastructure in this way results in the virtualisation of the network. Control of network devices is both unified and centralised, allowing numerous proprietary management tools to be replaced by a single all-encompassing network management system that controls all network equipment in exactly the same way. With the advent of SDN support in Q-NET™, the benefits enjoyed by the wider IT world are now being brought to satellite networks.

OVERVIEW

'Legacy networks, built using equipment from multiple vendors, each with its own proprietary control system, are highly fragmented and difficult to manage'

It is widely recognised that legacy networks have serious limitations and are consequently unable to readily meet the demands of modern user applications based on cloud and mobile computing.

SDNs virtualise the underlying network infrastructure, creating flexible, scalable networks that adapt dynamically to changing demands.

'Satellite modems are just another network device, performing many of the same functions as an Ethernet switch or router. As SDN networks become commonplace, we anticipate the coming together of the satellite industry to create an open standard for controlling the remaining non-IP functions of satellite modems and other satellite equipment, taking the concept of satellite SDNs to an entirely new level.'
Colin Mackay, Vice President of Engineering

SDNs are highly programmable, with a centralised control system that decouples decisions about how the network is managed from the routine task of handling specific user packets on a particular device. As a result, SDNs fundamentally change how networks are architected and how they deliver network services. SDNs are part of a wider move to virtualise services and applications, such as Software As A Service (SAAS), Infrastructure As A Service (IAAS), etc. Network Function Virtualisation (NFV) is an optional complementary technology that can be used to migrate specific network functions such as load balancing and firewalls from dedicated appliances to software running on standard servers, with the resulting functions and resources then being managed using SDN techniques.

As explained in this whitepaper, the growing shift to SDNs is set to apply as much to satellite networks as it does to terrestrial networks.

'We expect SDN concepts to evolve to allow many satellite functions to be provided as centrally controlled software services running on standardised hardware, such as Software Defined Radios'

SEPERATING CONTROL FROM DATA

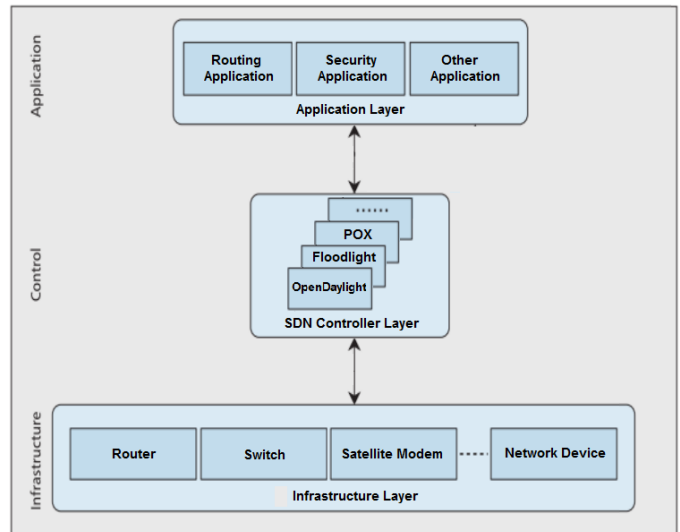SDN networks create a clear separation of control and data processing.

High-level network management involves tasks such as network discovery, the setting up of forwarding rules, computation of routes and gathering of metrics.

The lower-level function of the network devices by contrast is to implement the rules passed to them from the control system in order to process user traffic in the appropriate way.

By separating high-level control from the underlying network packet processing operations, a global network view becomes possible through a centralised control system. In the process, the network operator also gains vendor independence and provisioning and deployment of new services becomes much easier.

THE SDN CONTROLLER

Network high-level control is provided by an **SDN Controller**, which is an open-source or vendor-specific software application that runs on standard hardware. The SDN controller is itself capable of being programmed by higher level applications with business-level network policies (covering security, access, SLA requirements, etc.). The controller then converts these policies into instructions for the individual network appliances, such as switches and satellite modems. All communication from the SDN controller to higher and lower level applications and equipment uses open, standardised protocols.

Software Defined Network System Architecture

SDN SUPPORT IN Q-NET™

All hardware network elements of Q-NET™ support the **OpenFlow** protocol. OpenFlow is a standardised SDN protocol that support the configuration of network equipment at Layer 2.

OpenFlow maintains flow tables that consist of flow entries that determine how packets belonging to a particular flow will be processed and forwarded. A flow consists of rules that identify incoming packets as belonging to the flow, metrics for the flow and actions to be taken when a packet belonging to the flow is received.

In addition, Q-NET™ supports **sFlow**, which compliments the use of OpenFlow, allowing the collection and analysis of network metrics from disparate network devices using a standardised protocol. Like OpenFlow, sFlow is supported on all Paradise modems, **allowing an out-of-the-box SDN solution for network operators and service providers who are creating their own SDN satellite networks.**

Q-NET™ systems can be provided as turnkey rack solutions, complete with pre-configured SDN-compliant Ethernet switches and routers.

SUMMARY

The Q-NET™ satellite network platform is our scalable satellite communications system supporting highly-efficient bandwidth technology and sophisticated carrier and traffic management for point-to-point and point-to-multipoint networks.

Q-NET™ has been designed to allow the creation of secure, resilient networks that deal effectively with cyber threats and interference issues that would otherwise cause service degradations.

Q-NET™ now also offers support for software defined networks, which can be used in isolation or combination with other virtualisation techniques to more effectively manage satellite networks.

In addition, Q-NET™ offers flexible bandwidth on demand, dynamically switching bandwidth to where it is required in the network in response to changing user demands. Flexible bandwidth provisioning within Q-NET™ and centralised global network control make an unbeatable combination that is unrivalled by any other solution on the market.

Please contact us for further details of our SDN support and our Q-NET™ satellite network solution.

HIGHLIGHTS

▶ Allows the replacement of proprietary network device management tools with a standardised SDN controller

▶ Centralises control of networks, creating a global network view and making networks truly flexible and scalable

▶ Creates vendor independence, making the provisioning of network services independent of the underlying infrastructure

▶ Complements wider business strategies aimed at virtualising business services and applications (SAAS, IAAS, etc.)

▶ Allows satellite modems to be viewed and programmed in the same way as network Ethernet switches and routers

▶ Supports seamless network management and service delivery over both terrestrial and satellite assets

▶ Supported on all Q Series modems (Q-Flex™, Q-MultiFlex™, Q-Lite™, etc.)