

# Virtual Private Networks

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World Meteorological Organization  
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# Virtual Private Networks

- Why a virtual private network?
- What is a virtual private network?
- How to set up a virtual private network



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# WHY A VIRTUAL PRIVATE NETWORK?



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# IT Security risks are real

## TalkTalk and Post Office routers hit by cyber-attack

1 December 2016 | Technology



TalkTalk's DSL-3780 router is affected

Thousands of TalkTalk and Post Office customers have had their internet access cut by an attack targeting certain types of internet routers.

A spokeswoman for the Post Office told the BBC that the problem began on Sunday and had affected about 100,000 of its customers.

BBC



## Security of seismic sensor grid probed

7 August 2016 | Technology

Share



The security bugs mean data about quakes and other geological activity can be spoofed or hidden

Thousands of seismic sensors monitoring geological activity are vulnerable to cyber attack, suggests research.

The poor security controls around the way the sensors transmit data were detailed

# A Virtual Private Network ...

- ... looks to the user like a physical private line
- ... allows control over who can use that network
- ... usually travels across the internet
- ... can keep information private
- ... can prevent information being altered



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# A Virtual Private Network cannot ...

... guarantee access to bandwidth

... guarantee a routing across the internet

... guarantee response times

... protect an internet-facing server from a denial of service attack (DOS or DDOS)

# WIS connections

Learning from the requirements for the GTS:

- Allow use of common protocols used by WIS, especially ftp and sockets
- Avoid impact on message switching systems
- Guarantee an acceptable level of trust for members

# WHAT IS A VPN?

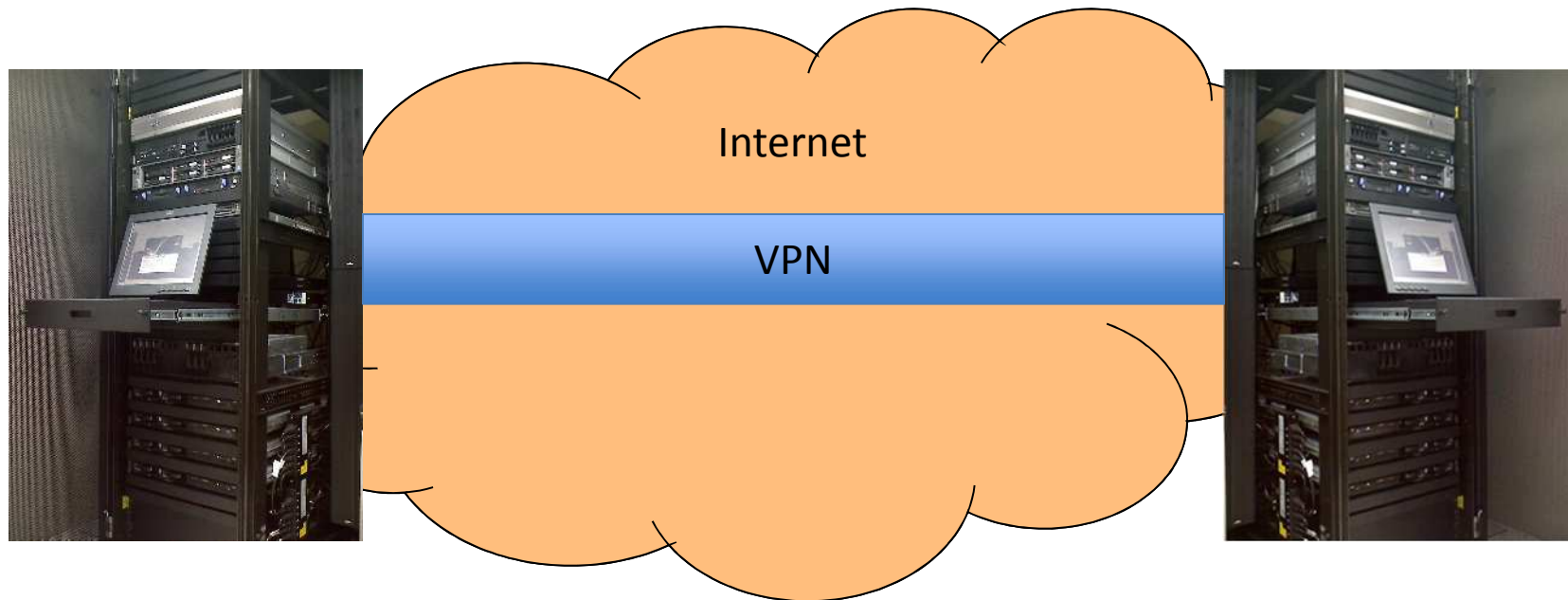


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# What is a Virtual Private Network?

**VPN = Virtual Private Network**



# Types of VPN

IP Transport  
Layer

Application

Transport

Network

Link

SSL, TLS, SSH

IPSec

ATM, Frame Relay, MPLS, L2TP, PPTP

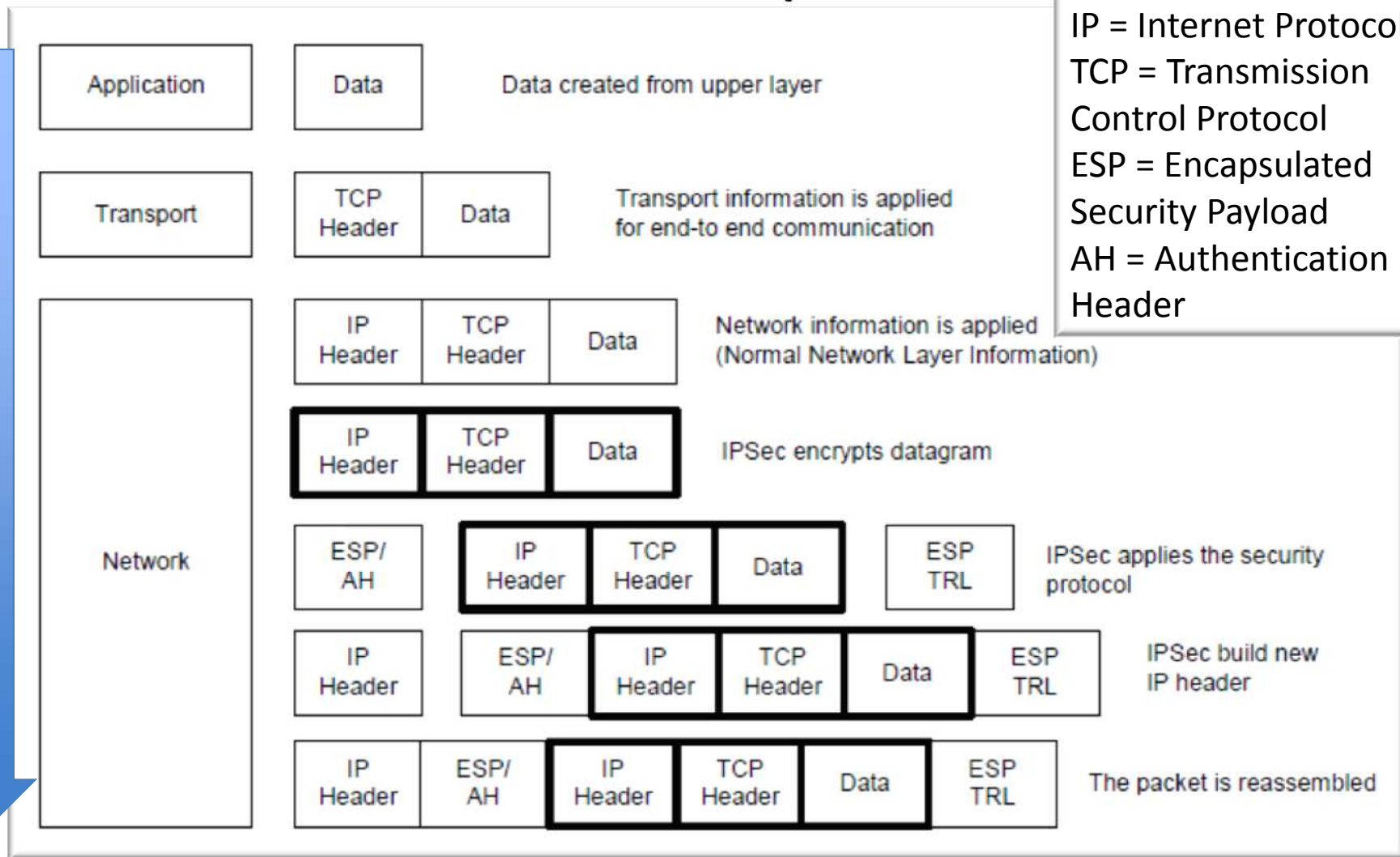


# Which type of VPN?

- MPLS
  - Used by RMDCN supplier
  - Can connect to many different centres
- IPSEC
  - Recommended for WIS connections across the internet
  - A different VPN connection is needed for each centre connected
- OpenVPN
  - Based on SSL/TLS
  - Used in RA III with Linux systems as gateways

# How IPSec works (tunnel mode)

IP = Internet Protocol  
 TCP = Transmission Control Protocol  
 ESP = Encapsulated Security Payload  
 AH = Authentication Header



# HOW TO SET UP A VPN



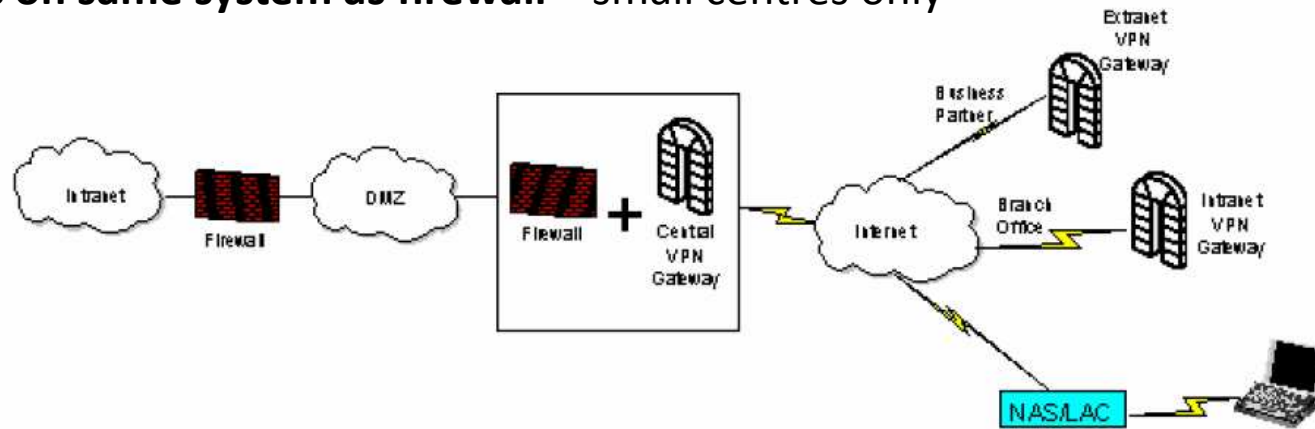
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# How to set up a VPN

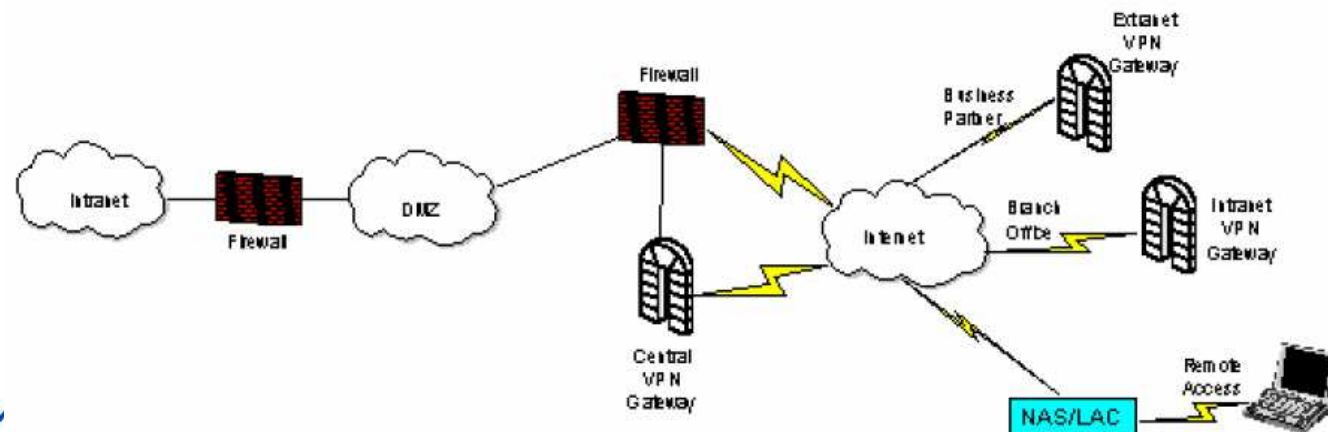
- Ask an expert!
- Read WMO-No. 1116 *Guide to Virtual Private Networks (VPN) via the Internet between GTS centres*
- Design your security infrastructure
- Choose and configure your solution

# Options for security configuration

VPN runs on same system as firewall – small centres only



VPN runs in its own DMZ on separate server



# Steps in implementing VPN (centres at each end must take part)

- (a) Agree upon the protocols to be used (mode, authentication and/or encryption, message digest algorithm, site authentication);
- (b) Define the pre-shared secret – this password must be defined and must be the same on both sides;
- (c) Confirm the VPN platforms to be used;
- (d) Agree on IP addresses for the exchange of data over the link;
- (e) Set up appropriate filter rules on the firewall, the following basic rules for an IPSec connection:
  - (i) Allow UDP port 500 to be used for ISAKMP;
  - (ii) Allow UDP port 4500 (Network Address Translation (NAT) traversal);
  - (iii) Allow IP protocol number 50 (ESP protocol);
- (f) Implement the defined configuration;
- (g) Test.



# Which equipment?

- IPSec implementations by major suppliers are now usually compatible
  - Routers
  - Firewalls
- OpenVPN is free software
  - Need to run a (Linux) server



VPN “looks like” a private network  
Internet – cheaper than private lines  
Still have to manage internet security risks

“Ask a friend”

## SUMMARY



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## References

WMO-No. 1116 – VPN Guide

WMO-No. 1115 – IT Security Guide



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