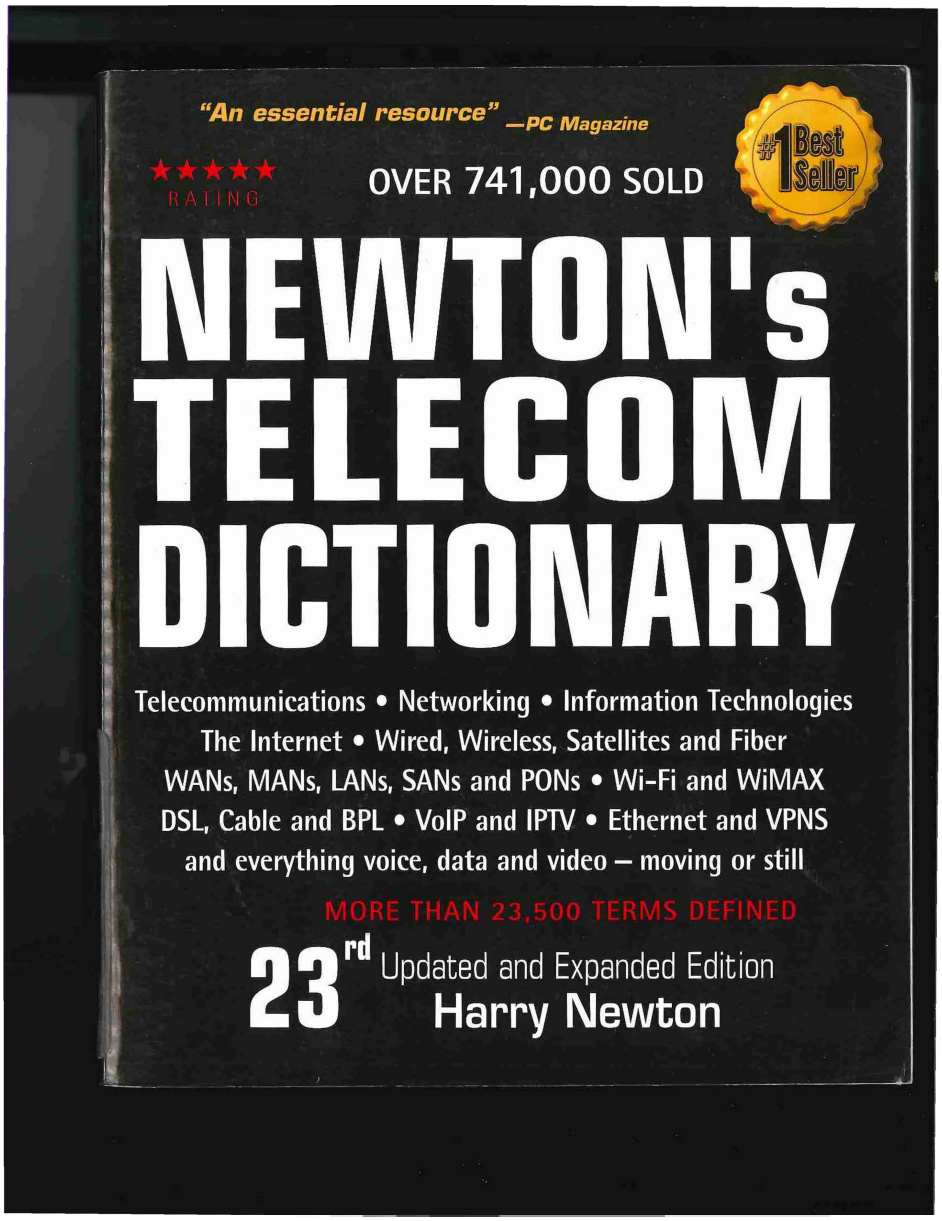
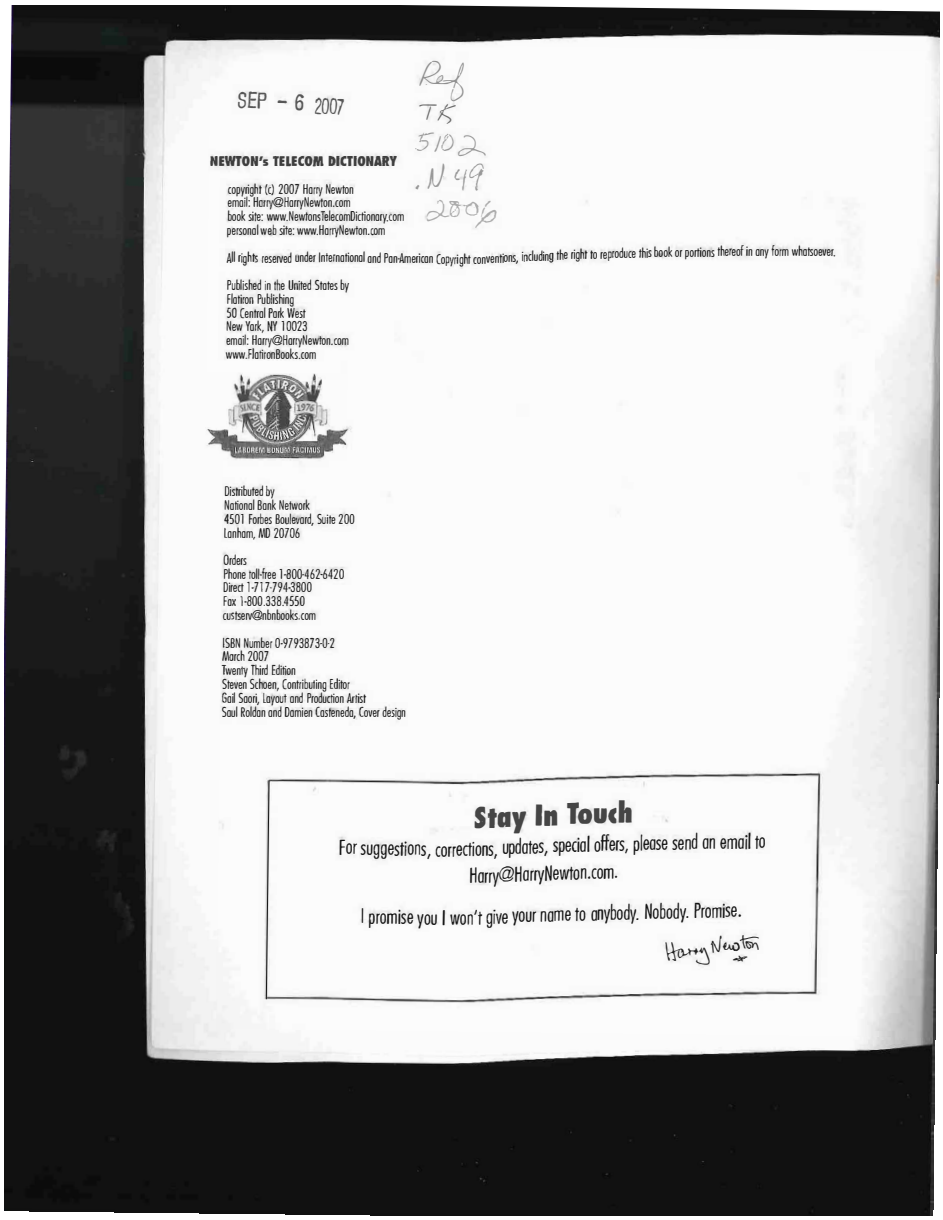


NEWTON's TELECOM DICTIONARY

23rd Edition

Harry Newton

New York



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Published in the United States by
Flatiron Publishing
50 Central Park West
New York, NY 10023
email: Harry@HarryNewton.com
www.FlatironBooks.com

Distributed by
National Bank Network
4501 Forbes Boulevard, Suite 200
Lanham, MD 20706

Orders
Phone toll-free 1-800-462-6420
Direct 1-717-794-3800
Fax 1-800.338.4550
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ISBN Number 0-9793873-0-2
March 2007
Twenty Third Edition
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I promise you I won't give your name to anybody. Nobody. Promise.

Harry Newton

local Internet Service Providers (ISPs), from corporations to Universities. The main provider of routers in the world is Cisco. It has built its gigantic business on selling routers – from small ones, connecting a simple corporate LAN to the Internet, to corporate enterprise wide networks, to huge ones connecting the largest of the largest backbone service providers. A router is, in the strictest terms, an interface between two networks.

Routers are highly intelligent devices which connect like and unlike LANs (Local Area Networks). They connect to MANs (Metropolitan Area Networks) and WANs (Wide Area Networks), such as X.25, Frame Relay and ATM. Routers are protocol-sensitive, typically supporting multiple protocols. Routers most commonly operate at the bottom 3 layers of the OSI model, using the Physical, Link and Network Layers to provide addressing and switching. Routers also may operate at Layer 4, the Transport Layer, in order to ensure end-to-end reliability of data transfer.

Routers are much more capable devices than are bridges, which operate primarily at Layer 1, and switches, which operate primarily at Layer 2. Routers send their traffic based on a high level of intelligence inside themselves. This intelligence allows them to consider the network as a whole. How they route (also called routing considerations) might include destination address, packet priority level, least-cost route, minimum route delay, minimum route distance, route congestion level, and community of interest. Routers are unique in their ability to consider an enterprise network as comprising multiple physical and logical subnets (subnetworks). Thereby, they are quite capable of confining data traffic within a subnet, on the basis of privilege as defined in a policy-based routing table. In a traditional router topology, each router port defines a physical subnet, and each subnet is a broadcast domain. Within that domain, all connected devices share broadcast traffic; devices outside of that domain can neither see that traffic, nor can they respond to it. Contemporary routers have the ability to define subnets on a logical basis, based on logical address (e.g., MAC or IP address) information contained within the packet header, and acted upon through consultation with a programmed routing table. In addition to standalone routers developed specifically for that purpose, server-based routers can be implemented. Such routers are in the form of high-performance PCs with routing software. As software will perform less effectively and efficiently than firmware, such devices generally are considered to be less than desirable for large enterprise-wide application, although they do serve well in support of smaller remote offices and less-intensive applications. Routers also are self-learning, as they can communicate their existence and can learn of the existence of new routers, nodes and LAN segments. Routers constantly monitor the condition of the network, as a whole, in order to dynamically adapt to changes in network conditions.

- Characteristics of routers can include:
- LAN Extension
- Store & Forward
- Support for Multiple Media
- Support for Multiple LAN Segments
- Support for Disparate LAN Protocols
- Filtering
- Encapsulation
- Accommodation of Various and Large Packet Sizes
- High-Speed Internal Buses (1+ Gbps)
- Self-Learning
- Routing Based on Multiple Factors
- Route Length
- Number of Hops
- Route Congestion
- Traffic Type
- Support for a Community of Interest (VLAN)
- Redundancy
- Network Management via SNMP

Router protocols include both bridging and routing protocols, as they perform both functions. Those protocols fall into 3 categories:

1. Gateway Protocols establish router-to-router connections between like routers. The gateway protocol passes routing information and keep alive packets during periods of idleness.

2. Serial Line Protocols provide for communications over serial or dial-up links connecting unlike routers. Examples include HDLC, SLIP (Serial Line Interface Protocol) and PPP (Point-to-Point Protocol).

3. Protocol Stack Routing and Bridging Protocols advise the router as to which packets should be routed and which should be bridged.

This definition courtesy of "Communications Systems & Networks," the best-selling book by Ray Horak, my Contributing Editor. To buy the book, www.amazon.com. See also Bridges, Hubs, Internetworking and Switches.

router-based firewall A router-based firewall is a packet-filtering router. Not everyone agrees that a packet-filtering router alone is a firewall. Many people insist that only a system that includes a dual-homed gateway is a firewall. However, other people argue that a packet-filtering router is a firewall because the router meets important firewall criteria: The router is a computer through which incoming and outgoing packets must pass through which only authorized packets can pass.

router droppings The inclusions added to e-mail messages when a server or recipient cannot be found. Cryptic and foul-looking, their meaning is usually impossible to fathom. Also called "daemon droppings."

router flapping Router flapping occurs when a malfunctioning router keeps going in and out of service, forcing neighboring routers to keep updating their routing tables, until all of the processing power is being siphoned off and no traffic is being forwarded, resulting in an Internet brownout. This can occur on all types of backbones, regardless of the architecture, but routed IP networks, which deploy the most routers, are particularly vulnerable.

router protocols Router protocols figure how A formula used by routers to determine the appropriate path onto which data should be forwarded. The routing protocol also specifies how routers report changes and share information with the other routers in the network that they can reach. A routing protocol allows the network to dynamically adjust to changing conditions, otherwise all routing decisions have to be predetermined and remain static.

Open shortest path first (OSPF). A routing protocol that determines the best path for routing IP traffic over a TCP/IP network. OSPF is an interior gateway protocol (IGP) that is designed to work within an autonomous system. It is also a link state protocol that provides less router to router update traffic than the REP protocol (distance vector protocol) that it was designed to replace.

Routing information protocol (RIP). A simple routing protocol that is part of the TCP/IP P protocol suite. It determines a route based on the smallest hop count between source and destination. RIP is a distance vector protocol that routinely broadcasts routing information to its neighboring routers and is known to waste bandwidth.

Border gateway protocol (BGP). A routing protocol that is used to span autonomous systems on the Internet. It is a robust and scalable protocol that was developed by the Internet Engineering Task Force (IETF). BGP4 supports the CEDR addressing scheme, which has increased the number of available IP addresses on the internet. It is estimated that there are more than 60,000 I3GP routes currently on the Internet.

Classless interdomain routing (CIDR). A method for creating additional addresses on the Internet that are given to Internet service providers, which in turn delegate them to their customers. CIDR reduces the burden on Internet routers by aggregating routes, so that one IP P address represents thousands of addresses that are serviced by a major backbone provider. All packets sent to any of those addresses are sent to the ISP (e.g., MCI or Sprint). In 1990, there were about 2,000 routes on the Internet. Five years later, there were more than 30,000. Without CIDR, the routers would not have been able to support the increasing number of internet sites.

Multiprotocol label switching (MPLS). A specification for Layer 3 switching from the IETF. MPLS uses labels, or tags, that contain forwarding information, which are attached to packets by the initial router. The switches and routers down the road examine the label more quickly than if they had to look up a destination addresses in a routing table. When fully implemented on the Internet, MPLS is expected to deliver the quality of service required to adequately support real-time voice and video as well as service level agreements (SLAs) that guarantee bandwidth to customers.

Resource reservation protocol (RSVP). A communications protocol that signals to a router to reserve bandwidth for real-time transmission. RSVP is designed to clear a path for audio and video traffic, eliminating annoying skips and hesitations. It has been sanctioned by the I EIF, because audio and video traffic is expected to increase dramatically on the Internet.

router rip A Cisco term. This command enables the RIP (Routing Information Protocol) routing process on the router for TCP/IP.

router switches A new breed of routers that in addition to routing TCP/IP packets (Internet packets) also routes cells, frames and other types of packets. See also Router.

routine A program, or a sequence of instructions called by a program, that has some general or frequent use.

routing The process of selecting the circuit path for a message.

routing area subdomain A cellular radio term. The combined geographic area of all Mobile Data Base Stations (MDBSs) controlled by a single Mobile Data Intermediate System (MD-IS).