Appendix I - HIGH SPEED INTERNET AVAILABLE IN WASHINGTON COUNTY, MAINE

(Prepared by Barbara Launer, SuprTEK and William Barnett, CCP Wireless)

TECHNOLOGY	DEFINITION	Transmission Speeds	ADVANTAGES	DISADVANTAGES	USAGE	Cost
T-1 and T-1 Frame	T1 or T-1. A full T1 or Trunk Level 1, is a digital transmission link w/ total signaling speed of 1.544 Mbps. Developed in 1957 by Bell Labs. T1 is a dedicated high speed telephone line for digital transmission that can handle 24 voice or data channels with an overall rate of 1.544 million bits per second (Mbps), over two twisted pair wires. T1 lines are most commonly used for private networks and corporate internet connections. **Frame Relay is T-1** circuit with a Committed Information Rate (CIR). A min. speed is set on the frame relay circuit, such as 384 Kbps. However, during no peak times and when bandwidth is avlb., the circuit can burst up to the full 1.544 Mbps.	♦ 1.544 Mbps ♦ 56 KBps - 1.544 Mbps Frame Relay	♦ Super Fast ♦ Symmetrical upload & download speeds. ♦ High Speed Connections all the time. ♦ Uses private lines more efficiently. ♦ Bandwidth can be allocated to accommodate different sites. ♦ Simplifies Network Management. ♦ Connect multiple office locations together. ♦ Not distance sensitive ♦ Available virtually anywhere there is phone service ♦ Well tested & proven technology. ♦ Designed to carry Bursty traffic ♦ Best method for providing VPN ♦ 99.9% Reliability ♦ Monitored 24X7	♦ Requires switch & router to convert signal to telephone lines. ♦ May require a long time for phone company to coordinate installation.	♦ Larger Office w/ multiple computers using Internet OR need to transfer large amounts of data or Graphic Files; Serious Internet research; Videoconferencing. ♦ Types of environments include: ~ E-commerce sites ~ Multiple locations ~ Telecommuters ~ Publishers ~ Printers ~ LAN-to-LAN communications ~ E-mail and file transfers ~ Multi-user Internet access	$200 - $1800 / month. Depends on Bandwidth.

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DSL	♦ Modem technology that turns existing phone line into 3 channel data delivery system – voice, data downstream & data upstream. Voice & data transmissions occur simultaneously, w/out interference. ♦ Requires Modems at each end of phone line.	♦ Up to 128 Kbps upload ♦ Up to 1.5 Mbps download ♦ 2.3Mbps via ADSL and 3Mbps via SDSL for business customers with existing equipment	♦ Dedicated / Always On. ♦ No Dialup ♦ Handles both voice & data over same telephone line. ♦ Multiple computers can be connected to a single DSL line.	♦ Distance Requirements – must be w/in 18,000 ft. (3 miles) of Telephone central office (CO). ♦ Speeds vary depending on distance from CO & condition of phone lines. ♦ Not widely available in rural areas.	♦ Single office ♦ Small number of computers ♦ Email, extensive browsing, large file transfers. ♦ Can be equipped w/ VPN to share some data between offices, but speed will suffer.	$40.00 - $200 / month + installation (~ $200)
Cable Modem	♦ High speed Internet delivered over cable TV line.	♦ Up to 1 Mbps upload ♦ Up to 3 Mbps download	♦ Dedicated / Always On. ♦ No Dialup ♦ Does not require phone line. ♦ Accommodates larger file transfers than dialup. ♦ Installation generally doesn't require long wait & is smooth and simple	♦ Typical speeds much lower than maximum due to over-subscription. *(All subscribers on the system share a single connection to the Internet)* ♦ Not widely available in Rural areas ♦ Geared to the home user, therefore if service fails, restoration may take some time. ♦ Data Transmission only (no voice). ♦ Security issues / requires firewall to ensure security. ♦ Can be affected by the weather.	♦ Single Office. ♦ Small # computers. ♦ Larger file transfers. **NOTE:** *Not the best choice for business, as most businesses are not wired for cable, and there can be significant congestion & data transmission delay.*	$80 - $100 / month +Installation **NOTE:** *Generally, must be Cable TV subscriber to receive best rate.*

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Satellite	♦ Data is sent between your satellite dish and satellite in space. Data is then relayed to a base station that has a direct connection to Internet and acts as a Hub.	♦ 128 Kbps Upload ♦ 400Kpbs Download **NOTE:** *These transmission speeds are for single user business plans. Higher speeds may be available for larger environments.*	♦ Ideal for remote locations w/ no telephone service. ♦ Available virtually anywhere (theoretically) ♦ Larger file transfer.	♦ Clear unobstructed view of southern sky and professional installation required. ♦ Affected by weather conditions, can be frequent downtime ♦ Variable upload & download speeds ♦ Speeds tend to be slower than Cable or DSL. ♦ High installation costs - ~$700 +	♦ Small Business ♦ Telecommuters ♦ Email, extensive browsing, larger file transfers.	$60 - $500/ month + installation, depending on User Level.
Wireless (not Wi-Fi)	♦ Proprietary radio frequency delivery system ♦ Requires radio and antenna at customer location	♦ 256Kbps upload (shared); up to 2Mbps (dedicated) ♦ 1.5 Mbps shared download; up to 2Mbps (dedicated)	♦ Dedicated; always on, no dial up or phone lines required ♦ Ability to have voice and data over the same line (VOIP) ♦ Multiple computers can be connected to the same subscription ♦ Low overhead to serve rural/remote areas	♦ Distance Requirements – from transmission tower: up to 6 miles non-line of site; up to 20 miles near-line of site ♦ Equipment cost at consumer end (high initial cost to user or service provider)	♦ Same as DSL for shared service ♦ Same as T-1 for dedicated service	$40-$1000/ month + installation (~$600 or $100 with a 2 year service contract)

DEFINITIONS:

Byte = 8 bits
Bit = smallest unit of information a computer can process
Broadband = is a way of quickly sending and receiving digital signals using IP, Internet Protocol. It refers to capacity, or how fat your pipe is, while low latency equates to speed. DSL Reports uses a simple analogy to explain the difference: "Imagine water running through a pipe. The pressure is latency, the width of the pipe is bandwidth. If you have a wide pipe but low pressure, you can move more water through the pipe but at a slower rate. If you have a narrow pipe but high pressure, you can move less water but at a faster rate."

DSL = Digital Subscriber Line.
ADSL = Asymmetric Digital Subscriber Line. A broadband service that provides fast connections to browse Web pages, but slower speeds when uploading information to the Net. Most common type of commercial DSL service for business & residential customers**. NOTE**: ADSL's local bandwidth is dedicated, which means although you share your Internet connection with others using your ISP, only a limited amount of people share bandwidth (around 20:1). These so-called "contention ratios" should be in your contract.

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SDSL = Symmetric Digital Subscriber Line (SDSL). With SDSL you get the same bandwidth (speed) in each direction. Although it is typically much more expensive than ADSL, it is better if you are running a web server or conducting other activities which would require a lot of data to be sent. A type of DSL that is common for business use.

Kbps = kilobits per second.
Kilobit = 1000 bits per second
KBps = Kilobytes per second
Kilobyte = 1,024 bytes

MB = Megabyte / 1,048,576

VPN = "Virtual Private Network." Introduced in the 1990's. It is a way to use a public telecommunication infrastructure, such as the Internet, to provide remote offices or individual users with secure access to their organization's network. A VPN works by using the shared public infrastructure while maintaining privacy through security procedures and tunneling protocols, such as the Layer Two Tunneling Protocol. In effect, the protocols, by encrypting data at the sending end and decrypting it at the receiving end, send the data through a "tunnel" that cannot be "entered" by data that is not properly encrypted. An additional level of security involves encrypting not only the data, but also the originating and receiving network addresses.