Local Terms and Definitions (Clause 1.4 only where indicated)

[Note: need to do a pass through the relevant section that contains Table 100–1—CLT RF Output Requirements to align those definitions with these or vice versa.]

[Need to review what of these would go into CL 1.4 vs what will go directly into draft text.]

Traditional: put a definition in for the PHY name. Refer to Marek.] Mark note: "10GBASE-XR"

Define: EPoC.

Mark Note for rev 02a: Added column on right to describe further action on the particular term.

Term	Defintion	Action
Active Subcarrier 10GBASE-XR	Any subcarrier other than an excluded subcarrier. In the upstream unused subcarriers are considered active subcarriers because they are used in probes. IEEE 802.3 Physical Layer specifications and management parameters for Ethernet Passive Optical Networks Protocol over Coax (See IEEE Std 802.3, Clause 100, Clause 101, and Clause 102).	Need to add definition to CL 1.4.
Active Subcarrier	Any subcarrier other than an excluded subcarrier. In the upstream unused subcarriers are considered active subcarriers because they are used in probes.	First Use. 100.2.6.1. Considering adding a sentence in section or in qualified subcarrier description in 100.1.1.
Adaptive Equalizer Tap	See *tap*.	Not needed.

~~Adaptive Pre-Equalizer~~	~~A circuit in a cable modem that pre-equalizes or pre-distorts the transmitted upstream signal to compensate for channel response impairments. In effect, the circuit creates a digital filter that has approximately the opposite complex frequency response of the channel through which the desired signal is to be transmitted.~~	First Use 100.2.4.1

	Linear pre-equalization is performed in the digital domain before IFFT processing. The CNU shall support a single complex coefficient (equalizer tap) per subcarrier that may be updated via the PHY Link. A CNU will use a default value of 1+j0 for all pre-equalizer coefficients.
	
	On update, the PHY Link may either indicate a specific complex coefficient or may indicate a multiplication factor for one or more subcarriers. Coefficients are updated only as part of a response to upstream probes received by the CLT. Pre-equalization may or may not be applied to all upstream CNU probe transmission as directed by the PHY Link. Pre-equalization is applied to all upstream CNU data transmissions.
	
	Upon reception of a coefficient multiplication factor, the CNU processes the update per subcarrier as follows:
	    $Ck(i+1) = Ck(i) * Ak(i)$
	where $Ck(i)$ is the pre-equalizer coefficient of the k-th subcarrier as used in the last probe transmission, $Ck(i+1)$ is the updated pre-equalizer coefficient of the k-th subcarrier and $Ak(i)$ is the coefficient information received via the PHY Link update. "*" indicates a complex multiplication.
	
	Upon applying any updates, the CNU shall normalize the new calculated coefficients as follows:
	    mean (abs $(Ck)^2$) = 1 (summation is over all k)
	
	The CLT shall compensate for phase offset and phase slope in the coefficients if the probes are used for timing offset measurements when calculating the pre-equalizer coefficient. Phase offset is compensated by averaging phase over all subcarriers and subtracting it. The phase slope is compensated by subtracting the phase linear trend over all subcarriers, after unwrapping 2*pi jumps.
		Will add new text to this section via comment.

~~Bit Loading~~	~~The technique of assigning the optimum number of bits (modulation order) for transmission per OFDM/OFDMA subcarrier.~~	remove
~~Burst~~	~~A single continuous RF signal from the cable modem upstream transmitter, from transmitter on to transmitter off.~~	
Burst Marker	A two-dimensional pattern assigned to *resource elements* by each CNU and detected by the CLT for start and stop burst length delineation.	First use 101.4.1 Considering adding sentence.

Carrier-To-Noise Ratio (CNR or C/N)	~~The ratio of signal (or carrier) power to noise power in a defined measurement bandwidth. 1)~~ For OFDM and OFDMA signals, the ratio of average signal power (P_{SIGNAL}) in the occupied bandwidth to the average noise power in the occupied bandwidth given by the noise power spectral density integrated over the same occupied bandwidth, expressed mathematically as $CNR = 10\ log_{10}[P_{SIGNAL}/\int N(f)df]$ dB. Note: This is a lower bound on the actual received signal-to-noise ratio~~. 2) For analog television signals, the ratio of visual carrier peak envelope power during the transmission of synchronizing pulses (P_{PEP}) to noise power (N), where the visual carrier power measurement bandwidth is nominally 300 kHz and the noise power measurement bandwidth is 4 MHz for NTSC signals. For the latter, the noise measurement bandwidth captures the total noise power present over a 4 MHz band centered within the television channel, and is expressed mathematically as CNR = 10 log₁₀(P_PEP/N) dB. Note: For analog PAL and SECAM channels, the noise measurement bandwidth is a larger value than the 4 MHz specified for NTSC (4.75 MHz, 5.00 MHz, 5.08 MHz, or 5.75 MHz, depending on the specific system).~~ *~~[Note: do we need to above Note: for EPoC?]~~*	First use 100.2.6.2.1 Probably need to state this as it related to occupied bandwidth understanding.
~~**Ceiling (Ceil)**~~	~~A mathematical function that returns the lowest-valued integer that is greater than or equal to a given value.~~	
OFDM Channel ~~[in CL 1.4]~~	For 802.3bn, a~~A~~ portion of the electromagnetic spectrum used to convey one or more OFDM or OFDMA RF signals between a transmitter and receiver. May be specified by parameters such as center frequency or bandwidth. ~~[Need to be careful of existing definition.]~~	First need: 1.4.281a In EPoC definitions
~~**Codeword**~~	~~Forward error correction data block, comprising a combination of information bits and parity bits.~~	Not needed
~~**Coefficient**~~	~~Complex number that establishes the gain of each tap in an adaptive equalizer or adaptive pre-equalizer.~~	Covered in other text.
~~**Complementary Pilots**~~	~~Subcarriers that carry data, but with a lower modulation order than other data subcarriers in a given Resource Block. Complementary pilots allow phase tracking along the time axis for frequency offset and phase noise correction, and used by the CLT upstream receiver for signal processing.~~	Not defined yet in RB architecture. Cover this later.
~~**Composite Noise Floor**~~	*~~[Note: need definition here or in text (it is used once).]~~*	First appears. 100.2.3.3
Continuous Pilots	Pilots that occur at the same subcarrier location in every OFDM symbol, and which are used for frequency and phase synchronization.	First use Table 100-1 Consider adding sentence to section with section reference.
~~**Cyclic Prefix (CP)**~~	~~A copy of the end of an OFDM symbol that is added to the beginning of the same symbol, in order to help mitigate the effects of micro-reflections and similar impairments.~~	Already in our **1.4.161a**

Term	Definition	Notes
OFDM Data Channel	A set of contiguous OFDM subcarriers of a *channel* constituting a "sub-channel" of the OFDM or OFDMA channel used to exchange MAC data between the CLT and one or more CNUs. The data channel is separate from the *PHY Link channel*.	May need to distinguish data port from PHY Link portion.
~~Decibel Carrier (dBc)~~	~~Ratio of the power of a signal to the power of a reference carrier, expressed mathematically as dBc = 10log₁₀(P_signal/P_carrier).~~	First used: Table 100-1 Well known term.
~~Decibel Millivolt (dBmV)~~	~~Unit of RF power expressed in terms of voltage, defined as decibels relative to 1 millivolt, where 1 millivolt equals 13.33 nanowatts in a 75 ohm impedance. Mathematically, dBmV = 20log₁₀(value in mV/1 mV).~~	First used: Table 100–2 Well known term.
Decibel Reference (dBr)	Ratio of a signal level to a reference signal level. When the signals are noise or noise-like, the measurement bandwidth for the two signals is the same. When both signal levels are in the same units of power, the ratio is expressed mathematically as $dBr = 10\log_{10}(P_{signal}/P_{reference})$. When both signal levels are in the same units of voltage, and assuming the same impedance, the ratio is expressed mathematically as $dBr = 20\log_{10}(V_{signal}/V_{reference})$. [Note: target dB material for draft text.]	First used: Table 100–1 May need to add a footnote clarifying relative difference of what to what and meansurement bandwidth. Ask RF experts if it is clear.
~~Discrete Fourier Transform (DFT)~~	~~Part of the family of mathematical methods known as Fourier analysis, which defines the decomposition of signals into sinusoids. Discrete Fourier transform defines the transformation from the time to the frequency domain. See also *inverse discrete Fourier transform*.~~	Does not appear in draft. Well known term.
~~Downstream~~	~~The direction of RF signal transmission from the CLT to one or more CNUs.~~	First use: 1.4.136a CL 1.4 Definition 1.4.173 is sufficient.
~~Downstream Channel~~	~~A single OFDM channel in the downstream direction.~~	Redundant.

DS	See *Downstream*.	First use: 45.2.1.60b without expanding Not present in CL 1.4. Need to add to CL 1.5 abbreviations.
~~**Encompassed Spectrum**~~	~~For an OFDM or OFDMA channel, the range of frequencies from the center frequency of the channel's lowest active subcarrier minus half the subcarrier spacing, to the center frequency of the channel's highest active subcarrier plus half the subcarrier spacing.~~	First use: 100.2.3.1 Defintion already in draft text.
~~**EPoC**~~	~~EPON Protocol over Coax~~	Already in CL 1.5 additions.
Excluded Subcarrier	A subcarrier that is not used and is set to zero-value by the transmitter.	First use: 100.2.3.1.1 wthout prior definition. Need to define in 100.1.1. Fix/add via comment.
Exclusion Band	A set of contiguous subcarriers within the OFDM or OFDMA channel bandwidth and that are set to zero-value by the transmitter. There may be one or more non-overlapping and non-adjacent sets within a channel.	First use: 100.2.6.1 wthout prior definition. Need to define in 100.1.1. Fix/add via comment.
~~**Fast Fourier Transform (FFT)**~~	~~An algorithm to compute the discrete Fourier transform from the time domain to the frequency domain, typically far more efficiently than methods such as correlation or solving simultaneous linear equations. See also *discrete Fourier transform*, *inverse discrete Fourier transform*, and *inverse fast Fourier transform*.~~	Well known term.
~~**FFT Duration**~~	~~Reciprocal of subcarrier spacing. Sometimes called "useful symbol duration." See also *symbol duration*.~~	First use: Table 100–1 Should be ok as stated.

Fiber Node	See *node*.	Not found in draft. May need to define in EFM introduction to EPOC and/or 103.1 introduction. "node" is found in 103.1 Overview. Simple fix/add via comment.
~~**Floor**~~	~~A mathematical function that returns the highest-valued integer that is less than or equal to a given value.~~	Well known term.
~~**Forward**~~	~~See *downstream*.~~	Not found in CL1.4 or in draft.
Group Delay (GD)	The negative derivative of phase with respect to frequency, expressed mathematically as GD = -(dφ/dω) and stated in units of time such as nanoseconds or microseconds.	Not present in draft. Group Delay and Group Delay Variation defined in 1.4.215 for 10BASE36. May need to augment to also show EPoC use and reference. Evaluate: may need to add to draft.
Group Delay Ripple	Group delay variation which has a sinusoidal or scalloped sinusoidal shape across a specified frequency range.	
Group Delay Variation (GDV) or Group Delay Distortion	The difference in group delay between one frequency and another in a circuit, device, or system.	
Guard Interval	In the time domain, the period from the end of one symbol to the beginning of the next symbol, which includes the cyclic prefix and applied transmit windowing. Also called guard time.	Not present in draft or CL 1.4. Considering defining as part of extended OFDM symbol definition in 100.1.1. Consider add via comment.

Guard Band	A narrow range of frequencies in which user data is not transmitted, located at the lower and upper edges of a *channel*, at the lower and upper edges of a gap within a channel, in between channels, or between *resource blocks*.	First use: 102.5.3 in conjunction with subcarriers. Need to define in 100.1.1. Consider add via comment.
Headend	A central facility that is used for receiving, processing, and combining broadcast, narrowcast and other signals to be carried on a cable network.	Not present in draft. Defined in 1.4.215 for 10BASE36. May need to augment to also show EPoC use and reference. Evaluate: may need to add to draft for EFM introduction.
Hum Modulation	Amplitude distortion of a signal caused by the modulation of that signal by components of the power source (e.g., 60 Hz) and/or its harmonics.	Not presented in draft or CL 1.4. Same for "hum" This is an electrical requirements parameter. Should be in draft.
~~**Hybrid Fiber/Coax (HFC)**~~	~~A broadband bidirectional shared-media transmission system or network architecture using optical fibers between the headend and fiber nodes, and coaxial cable distribution from the fiber nodes to the subscriber locations.~~ (may reuse this definition in intro.)	Already listed in CL 1.5 abbreviation additions for "HFC" expanding to "Hybrd Fiber Coax Network". May need to add as part of EFM EPoC introduction.

Inverse Discrete Fourier Transform (IDFT)	Part of the family of mathematical methods known as Fourier analysis, which defines the "decomposition" of signals into sinusoids. Inverse discrete Fourier transform defines the transformation from the frequency to the time domain. See also *discrete Fourier transform*.	Well known terms.
Inverse Fast Fourier Transform (IFFT)	An algorithm to compute the inverse discrete Fourier transform from the frequency domain to the time domain. See also *discrete Fourier transform*, *fast Fourier transform*, and *inverse discrete Fourier transform*.	
LDPC	An forward error correction process known as Low Density Parity Check..	Found defined in title for 101.3.4. Found in 1.4.234 as part of another size and rate. May need to add or amend this.
Mean Time To False Packet Acceptance (MTTFPA)	The average time in which a post FCS check MAC frame will contain errors. The MTTFPA is defined to be greater than 1.4 x 10^{10} years. [Note: evaluate if we need to put value elsewhere in clause text. Peter advises not, as we have difficulty measuring this….Maybe state it as an intent.]	Not found in draft or CL 1.4. Added to CL 1.4.
Modulated Spectrum	1) Downstream modulated spectrum – Encompassed spectrum minus the excluded subcarriers within the encompassed spectrum. Excluded subcarriers include any individually excluded subcarriers and all the subcarriers in any exclusion bands. This also is the spectrum comprising all active subcarriers. 2) Upstream modulated spectrum – The spectrum comprising all non-zero valued subcarriers of a CNU's OFDMA transmission. The width of a transmitted subcarrier is equal to the subcarrier spacing. [covered in clause text.]	
Modulation Error Ratio (MER)	The ratio of average signal constellation power to average constellation error power – that is, digital complex baseband signal-to-noise ratio – expressed in decibels. MER is a measure of the cluster variance that exists in a transmitted or received waveform at the output of an ideal receive matched filter. MER includes the effects of all discrete spurious, noise, carrier leakage, clock lines, synthesizer products, linear and nonlinear distortions, other undesired transmitter and receiver products, ingress, and similar in-channel impairments.	First use: 100.3.5 Not found in CL 1.4 Either Add as part of 100.1.1 or as part of 100.3.5
Next Codeword Pointer (NCP)	A message block contained within a downstream PHY Link message used to identify where a data codeword begins in the next downstream cycle.	Define via usage in draft text or add as a local abbreviation.

~~Node~~	~~A bi-directional optical-to-electrical RF interface between a fiber optic cable and the coaxial cable distribution network. Also called fiber node.~~	Found in: 103.1 Remedy as part of qualifying as "fiber node" above.
~~Occupied Bandwidth~~	~~1) Downstream – The sum of the bandwidth in all standard channel frequency allocations (e.g., 6 MHz or 8MHz spaced television channels) that are occupied by the OFDM channel. Even if one active subcarrier of an OFDM channel is placed in a given standard channel frequency allocation, that standard channel frequency allocation in its entirety is said to be occupied by the OFDM channel.~~ ~~2) Upstream – For a single OFDMA channel, the sum of the bandwidth in all the subcarriers of that OFDMA channel which are not excluded calculated as the number of subcarriers which are not excluded, multiplied by the subcarrier spacing.~~ [covered in clause text.]	Found in 100.2.3.1. Already described.
~~Orthogonal Frequency Division Multiplexing (OFDM)~~	~~A data transmission method in the downstream direction in which a large number of closely-spaced or overlapping very-narrow-bandwidth orthogonal QAM signals are transmitted within a given channel. Each of the QAM signals, called a subcarrier, carries a small percentage of the total payload at a very low data rate.~~	Part of already added CL 1.5 abreviations.
~~Orthogonal Frequency Division Multiple Access (OFDMA)~~	~~An OFDM-based multiple-access scheme in which different subcarriers or groups of subcarriers are assigned to different devices in the upstream direction.~~	Part of already added CL 1.5 abreviations.
OFDMA Frame	In the upstream: a grouping of a number of repeating (M) consecutive OFDMA symbols. A frame comprises either a group of probing symbols or a column of Resource Blocks across the spectrum of the OFDMA channel. Multiple CNUs can share the same OFDMA frame simultaneously by transmitting data and pilots on allocated subcarriers within the frame. The value M is configured by the CLT via the PHY Link.	First use: 102.4
OFDM Symbol	See *symbol duration*.	First use: 1.4.161a Check defintions and update if needed. Evaluate again after resource blocks are defind and accepted.
~~PHY Link Channel (PLC)~~	~~A set of contiguous OFDM subcarriers constituting a "sub-channel" of the OFDM or OFDMA channel used to exchange physical layer management parameters between the CLT and one or more CNUs. The PLC is separate from the~~ *~~data channel~~*~~.~~ *~~[Note: need to fin PHY Link, pilots, and any guard bands, etc. In this definition?]~~*	First use: 45.2.1.60d and 102.1 Already defined in draft text.

PHY Link Channel Frame	In downstream OFDM transmission, a repeating group of 128 consecutive OFDM symbols, signaled as the beginning of the first OFDM symbol containing the PHY Link preamble. The PHY Link channel frame establishes the downstream OFDM frame for the data channel. *[Note: sanity check on alignment of preamble, etc, needed.]*	First use: 102.1 Already defined in draft text.
Pilot	A dedicated OFDM subcarrier that may be used for such purposes as channel estimation (measurement of channel condition), synchronization, and other purposes. See also *complementary pilots*, *continuous pilots* and *scattered pilots*.	First use: Table 45–191a and 100.2.3.1.1 Not found in CL 1.4 Consider defining as part of 100.1.1.
Preamble	A data sequence transmitted at or near the beginning of a frame, allowing the receiver time to achieve lock and synchronization of transmit and receive clocks.	Found within CL 1.4 definitions.. First use: 101.2.2. Consider qualifying "preamble", such as "EPON preamble", etc in all our draft text where any ambiguity might arise.
Pre-equalizer	See *adaptive pre-equalizer.*	Redundant.
Profile	The set of parameters that defines how information is transmitted from a CLT to a CNU or from a CNU to a CLT. Elements of a profile include: modulation order, forward error correction, preamble, and guard interval. *[Note: need to refine when we define what is in a profileProfile.]*	First use: 45.2.7a.1 and 100.2.6.1 Not found in CL 1.4. May need better overview of profile and contents for EPoC use.
Propagation Delay	The time required for a signal to propagate between the CLT and a CNU over the network. Also called transit delay.	First use: Figure 103-4. Ok as drafted.
Pseudo Random Binary Sequence (PRBS)	A deterministic sequence of bits that appears to be random, that is, with no apparent pattern. Also called pseudo random bit stream.	Found in CL 1.5. No need.

QAM Signal	Analog RF signal that uses quadrature amplitude modulation to convey information such as digital data.	First use: 1.4.281b, present in abbreviations.
Quadrature (Q)	The imaginary part of a vector that represents a signal, with 90 degrees phase angle relative to a reference carrier. See also *in phase (I)*.	
Quadrature Amplitude Modulation (QAM)	A modulation technique in which an analog signal's amplitude and phase vary to convey information, such as digital data. The name "quadrature" indicates that amplitude and phase can be represented in rectangular coordinates as in-phase (I) and quadrature (Q) components of a signal.	Well known term.
Quadrature Phase Shift Keying (QPSK)	A form of digital modulation in which four phase states separated by 90 degrees support the transmission of two bits per symbol. Also called 4-QAM.	First use: Table 45–191a Well known term.
Randomizer	A process (also known as a scrambler), in which the data to be transmitted is randomized using a PRBS scrambler. Randomization spreads out the energy across the spectrum, ensures uniform population of all of the data constellation points, and minimizes the likelihood of long strings of all zeros or ones. [in Cl 1.4]	
Resource Block (RB)	In the upstream OFDMA channel, a frequency and time grouping of *resource elements* defined by a dedicated set of (N) contiguous subcarriers and a consecutive number of (M) symbols defined by the *OFDMA frame* length. There are multiple non-overlapping Resource Blocks defined for each OFDMA frame. A CNU may be assigned to transmit in one or more contiguous Resource Blocks in an OFDMA frame. The allocation (profile) of RBs within the OFDMA frame is known by the CLT and each CNU and is configured via management.	First use: 45.2.1.60c and 101.4.1.4 Consider adding to local terms and definitions with a section reference when available.
Resource Element (RE)	In the upstream OFDMA channel, a one-subcarrier by one-symbol element that is allocated within *a resource block* and used to convey a portion of the upstream signal; e.g. data, pilot, or burst marker information.	First use: 101.4.1.1 in draft text. May need update when RB are defined. Consider adding to local terms and definitions with a section reference when available.
Return	See *upstream*.	Use *upstream* in place of return.

Return Loss (R)	The ratio of incident power P_i to reflected power P_R, expressed mathematically as $R = 10\log_{10}(P_i/P_R)$, where R is return loss in decibels.	Not present in draft. Sufficiently defined in 1.4.351 for 10BASE36. May need to augment to also show EPoC use and reference.
Reverse	See *upstream*.	Use *upstream* in place of reverse.
RF Channel	See *channel*.	Should be referring to OFDM channel definition.
Roll-off Period (RP)	Duration in microseconds, or the equivalent number of IFFT output sample periods, used for the ramping up (or ramping down) transition region of the Tukey raised-cosine window, which is applied at the beginning (and end) of an OFDM symbol. In the case of no transmit windowing, the roll-off duration is zero and there are no samples in the roll-off period.	
Scattered Pilots	Pilots that do not occur at the same frequency in every symbol that are used for channel estimation. The locations of scattered pilots change from one OFDM symbol to another following a pattern known by the CLT and each CNU.	
Scrambler	See *randomizer*.	Sufficiently defined in CL 1.4.359.
Signal-To-Composite Noise (SNC)	The ratio of signal power to composite noise power in a defined measurement bandwidth, where composite noise is the combination of thermal noise and composite intermodulation distortion (noise-like distortion).	Not present in draft.
Standard Frequencies (STD)	Used in North America, the method of spacing channels on a cable television system defined in [CEA-542-D]. Channels 2-6 and 7-13 use the same frequencies as over-the-air channels 2-6 and 7-13. Other cable channels below Ch. 7 down to 91.25 MHz and above Ch. 13 are spaced in 6 MHz increments. *[Note: only keep above if STD is used in the draft. If kept, provide CEA reference]*	Not present in draft. Define in draft text if needed.
Subcarrier	One of a large number of closely spaced or overlapping orthogonal narrow-bandwidth data signals within an OFDM channel. Also called a tone. See also *excluded subcarrier*, *unused subcarrier*, and *used subcarrier*.	First use: 1.4.281b OFDM symbol. Consider defining as part of 1.4.281a for OFDM Channel.

Symbol Duration	Sum of the FFT duration and cyclic prefix duration.	Not found in draft. Consider defining as part of OFDM symbol, or Extended OFDM Symbol in 100.1.1
Tap	1) In the feeder portion of a coaxial cable distribution network, a passive device that comprises a combination of a directional coupler and splitter to "tap" off some of the feeder cable RF signal for connection to the subscriber drop. So-called self-terminating taps used at feeder ends-of-line are splitters only and do not usually contain a directional coupler. Also called a multitap. 2) The part of an adaptive equalizer where some of the main signal is "tapped" off, and which includes a delay element and multiplier. The gain of the multipliers is set by the equalizer's coefficients. 3) One term of the difference equation in a finite impulse response or an infinite impulse response filter. The difference equation of a FIR follows: $y(n) = b_0x(n) + b_1x(n-1) + b_2x(n-2) + \ldots + b_Nx(n-N)$.	First use of 1): 101.1. Consider using as part of topology overview in EFM introduction to EPoC. 2) defined in pre-equalizer proposed draft text. Not needed as definition. 3) not used or needed in draft at this time.
Thermal Noise	The fluctuating voltage across a resistance due to the random motion of free charge caused by thermal agitation. Also called Johnson-Nyquist noise. When the probability distribution of the voltage is Gaussian, the noise is called additive white Gaussian noise (AWGN).	Not found in draft.
Unused Subcarrier	Subcarriers in an upstream OFDMA channel which are not excluded, but are not assigned to Resource Blocks. Unused subcarriers do not convey data and may be used for probe signals.	Not found in draft. Define in text if/when need arises.
Upstream Upstream Channel	The direction of RF signal transmission from a CNU to the CLT. Also called return or reverse.	First used: 102.4 Use defined in draft text.
Used Subcarrier	An upstream subcarrier that is part of a Resource Block. The cable modem transmits data, ranging, and probes on these subcarriers as directed by the CLT.	Not found in draft. Define in text if/when need arises.

~~Useful Symbol Duration~~	~~See *FFT duration*.~~	Not found in draft. Consider defining as part of OFDM symbol, or Extended OFDM Symbol in 100.1.1
Windowing	A technique to shape data in the time domain, in which a segment of the start of the IFFT output is appended to the end of the IFFT output to taper or roll-off the edges of the data using a raised cosine function. Windowing maximizes the capacity of the channel by sharpening the edges of the OFDM/A signal in the frequency domain.	First use: 45.2.1.60b.3 and 100.2.3.1 Consider defining as part of OFDM symbol, or Extended OFDM Symbol in 100.1.1
~~Word~~	~~Information part of a codeword, without parity. See also *codeword*.~~	Not found in draft as "word".
~~Zero Bit-Loaded Subcarrier~~	~~A subcarrier with power but not carrying user data that could be modulated by a PRBS.~~	Not found in draft. Consider defining in draft text when needed.
Zero-Valued Subcarrier	A subcarrier with no power. See also *excluded subcarrier*.	First similar use; 100.2.3.1.1 and Table 100–4. Consider defining as part of other qualified subcarriers in 100.1.1