

U.S. Coast Guard Information Technician Cheat Sheet

Traffic Analysis Terms

Traffic Load the ratio of call arrivals in a specified period of time to the average amount of time taken to service each call during that period.

erlang (E) One erlang is 3600 seconds of calls on the same circuit, or enough traffic load to keep one circuit busy for 1 hour.

Centum Call Seconds One CCS is 100 seconds of calls on the same circuit.

Average Hold Time AHT is the total time of all calls in a specified period divided by the number of calls in that period.

Busy Hour Traffic the hour of the day with the highest traffic intensity is called the busy hour. In this case, the daily peak traffic intensity is also called busy hour traffic or busy hour usage. Busy hour traffic is the number of erlangs or CCS used during the busy hour.

Peg count is the number of calls in a specified period of time.

Busy peg the number of times a trunk group is accessed to make an outgoing call and it is in use or busy.

Grade of Service (GoS) is defined as the probability that calls will be blocked while attempting to seize circuits.

Carried traffic is the traffic that is actually serviced by telecommunications equipment.

Offered traffic is the actual amount of traffic attempts on a system.

Daily Peak Period (DPP) records the highest traffic volume measured during a day. This method requires continuous measurement and is typically used in environments where the peak hour may be different from day to day.

Fixed Daily Measurement Interval (FDMI) requires measurements only during the predetermined peak periods. It is used when traffic patterns are somewhat predictable and peak periods occur at regular intervals. Business traffic usually peaks around 10:00 a.m. to 11:00 a.m. and 2:00 p.m. to 3:00 p.m.

Erlang B

$$B(c,a) = \frac{\frac{a^c}{c!}}{\sum_{k=0}^c \frac{a^k}{k!}}$$

- B(c,a) probability of blocking a call
- c is the number of circuits
- a is the traffic load

$$B(8,4.53) = \frac{\frac{4.53^8}{8!}}{\sum_{k=0}^8 \frac{4.53^k}{k!}}$$
$$B(8,4.53) = \frac{4.39809992845264833770089285714}{\sum_{k=0}^8 (1 + 4.53 + 10.26045 + 15.4932795 + 17.54613903375 + 15.8968019645775 + 12.0020854832560125 + 7.767063891307105232142857)}$$
$$B(8,4.53) = \frac{4.39809992845264833770089285714}{84.495819872890617732142857}$$
$$B(8,4.53) = 0.0520510947768638832211314889713364792038405723028320$$
$$B(8,4.53) = 5\%$$

Erlang C

$$C(c,a) = \frac{\frac{a^c}{c!} \frac{c}{c-a}}{\sum_{k=0}^{c-1} \frac{a^k}{k!} + \frac{a^c}{c!} \frac{c}{c-a}}$$

- C(c,a) probability of call delay
- c is the number of circuits
- a is the traffic load

$$C(5,1.5) = \frac{\frac{1.5^5}{5!} \frac{5}{5-1.5}}{\sum_{k=0}^{5-1} \frac{1.5^k}{k!} + \frac{1.5^5}{5!} \frac{5}{5-1.5}}$$
$$C(5,1.5) = \frac{0.0904017857142}{\sum_{k=0}^{5-1} \frac{1.5^k}{k!} + 0.0904017857142}$$
$$C(5,1.5) = \frac{0.0904017857142}{\frac{563}{128} + 0.0904017857142} = 0.02013923421181619...$$
$$C(5,1.5) = 0.0201392...$$

Poisson

$$P(c,a) = 1 - e^{-a} \sum_{k=0}^{c-1} \frac{a^k}{k!}$$

- P(c,a) probability of blocking a call
- e is the natural log base
- c is the number of circuits
- a is the traffic load

$$P(9,4.69) = 1 - e^{-4.69} \sum_{k=0}^{9-1} \frac{4.69^k}{k!}$$
$$P(9,4.69) = 1 - e^{-4.69} \sum_{k=0}^{9-1} = (1 + 4.69 + 10.99805 + 17.1936181\bar{6} + 20.15951730041\bar{6} + 18.9096272277908\bar{3} + 14.7810252830565013\bar{8} + 9.9032869396478559305 + 5.80580196836855539288194) = 103.440926879279742849788194$$
$$1 - e^{-4.69}(103.440926879279742849788194) = 0.0497207...$$
$$P(9,4.69) = 5\%$$

NetOps

INFOCON 5 routine network operations (NetOps); this occurs when “baselining” should be accomplished and maintained. Baselining is discussed with additional detail in the next section.

INFOCON 4 increases NetOps readiness in preparation for operations or exercises, with limited impact to the end-user.

INFOCON 3 further increases NetOps readiness by increasing the frequency of validation of the information network and its corresponding configuration. Impact to end-users is minor.

INFOCON 2 further increase in frequency of validation of the information network and its corresponding configuration. Increased impact to network administrators. Can benefit from “hot spare” equipment which reduces downtime by allowing rebuilding in parallel. Impact to end-users could be significant for short periods, which can be mitigated through training and scheduling.

INFOCON 1 highest readiness condition which addresses intrusion techniques that cannot be identified or defeated at lower readiness levels (e.g. kernel root kits) Impact on administrators is significant. Impact to end-users could be significant for short periods, which can be mitigated through training and scheduling.

Grounding

NEC article 250 Grounding of Power Services.

NEC article 800 Grounding of Communication Circuits.

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Mnemonic Grass O Sky O Dirt A

Color-coding of specific termination fields

Termination Type	Color	Typical Application
demarcation point	orange	central office connection
network connection	green	user side of central office connection
cabling subsystem 3	white	First-level backbone
cabling subsystem 2	gray	Second-level backbone
campus cabling	brown	termination of campus cable between buildings
cabling subsystem 1	blue	termination of station telecommunications media
miscellaneous	yellow	alarms, security, or energy management

OSI Model

OSI Model			
	Layer Number	Layer Name	Function
Data	7	Application	Network process to application
	6	Presentation	Convert machine data
	5	Session	Interhost communication
Segments	4	Transport	End-to-End connections
Packet /Datagram	3	Network	Path determination
Frame	2	Data link	Physical addressing
Bit	1	Physical	binary transmission

Mnemonic
The Physical Data Network Must Transport the Session Presentation to the Application.

Communication Standards

Primary Rate ISDN (ISDN-PR1) has 23 bearer channels (64 kbit/s each) for a **combined data rate of 1.5 Mbit/s** (US standard).

T1 or DS1 A DS1 circuit is made up of twenty-four 8-bit channels (also known as timeslots or DS0s), each channel being a 64 kbit/s DS0 multiplexed carrier circuit. A DS1 is also a full-duplex circuit, which means the circuit transmits and receives 1.544 Mbit/s concurrently.

T3 or DS3 This level of carrier **can transport 28 DS1(T3) level signals** within its payload. The data rate for this type of signal is 44.736 Mbit/s (45 Mb).

Uninterruptible Power Supply Types

Standby also called an “offline UPS” draws AC current from the outlet and switches to the battery after detecting a loss of power. This switch only takes milliseconds, and is often unnoticed.

Line Interactive interacts with the AC power to smooth out the waveforms and correct the rise and fall of voltage.

Online the most advanced UPS. The inverter rectifies incoming AC power to DC current, which charges the battery, and then changes the DC current back to AC to provide clean power. In this case, the protected equipment never receives power directly from the AC source. These units contain cooling fans, which have the potential to influence your telecommunications room’s environment (i.e. sound, temperature).

UPS purposes

The Coast Guard primarily uses a UPS in one of three ways:

Provide emergency power During the total loss of commercial power, a UPS will carry the load of all equipment plugged into the UPS for an amount of time.

Provide clean power Commercial power is not always “clean”. In some instances, the AC power in a building will not be uniform, or can be susceptible to voltage spikes or drops.

Unattended shutdown The design of orderly shutdown from the software prevents data loss or data corruption by properly terminating applications instead of just cutting off the power.

UPS: Determining System Power Requirements

Amperage multiply the number of amps by the nominal line voltage. (Nominal line voltage for North America is 120)

Wattage multiply the number of watts by 1.4.

Types of Backups

Full This type backs up all selected files and directories and clears the archive attributes. This backup type is normally conducted weekly and serves as the foundation for other types of backups.

Incremental During this type of backup the software backs up only the files or directories that have changed since the last Full or Incremental backup. The software establishes which files have changed based on the status of the archive attributes. **This type of backup clears the archive attributes.**

Differential This type of backup is the same as an Incremental backup, however the software doesn’t clear the archive attribute, thus all files and directories that have changed since the previous Full are backed up.

Advantages of Backups

- The advantage of an **Incremental** backup over a Differential is **less space used** on the backup media.
- The advantage of a **Differential** over an Incremental is **faster restoration time**.

Physical Security

Exclusion Area An exclusion area is the **most secure** type of restricted area. It may be located within a less secure type of restricted area. Access to the exclusion area constitutes, or is considered, actual access to the security interest or asset

Limited Area A limited area is the **second most secure** type of restricted area. It may be located inside a controlled area, but is never inside an exclusion area. Uncontrolled or unescorted movement could permit access to the security interest or asset

Controlled Area A controlled area is the **least secure** type of restricted area. It may also serve as a buffer zone for exclusion and limited areas, thus providing administrative control and protection against sabotage, disruption, or potentially threatening acts. Uncontrolled movement may or may not permit access to the security interest or asset

Basic color codes for AC wiring

	Hot 115 VAC		Neutral, return path from hot wire
	Ground		Hot, 115 VAC for 220-240 VAC.

25 pair color code

Group One white, red, black, yellow, violet.

Group Two blue, orange, green, brown, slate.

Group One Mnemonic **Winchester Rifles** Bring **You** **Victory**

Group Two Mnemonic **BOG** BruSh