Telephone Traffic Engineering Primer

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New Terminology

Blocking

P01

Erlangs

?

Trunks

CCS

Grade of Service
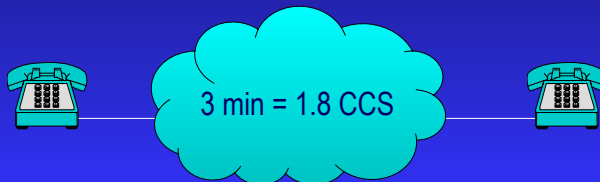
Busy Hour

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Traffic Units

Data World

- kbps or mbps

Voice World

- CCS (Hundred Call Seconds)
- Erlangs

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CCS

- CCS – Hundred Call Seconds

- A 3 minute telephone call (180 seconds) generates 1.8 CCS of traffic

3 min = 1.8 CCS

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Erlang

- One Erlang equals the amount of calling that fully occupies one voice circuit or trunk during a specified interval

- Named after Danish scientist A.K. Erlang

- Measurement interval of one hour means 1 Erlang equals one hour of calling

- 1 Erlang = 36 CCS

Busy Hour

- Telephone traffic consists of peaks and valleys

- Systems are designed for the peak hour, (called the busy hour)

- The ITU-T suggests choosing the busy hour as the average busy hour of the 30 busiest days of the year

Packet Switched Networks

- Packet networks are overbooked in the same way airlines overbook flights

- Congestion results is queuing

- Variability of queuing delays between successive packets is called jitter

- Excessive queuing results in buffer overflow and packet loss

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Circuit Switched Networks

- Circuit switched networks are not overbooked

- Bandwidth is not shared therefore queuing and jitter are negligible

- Loss is due only to transmission errors

- Limited network resources means some users will be denied access (blocked)

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Call Blocking

- The amount of blocking is called the Grade of Service and is usually measured during the busy hour

- Grade of Service is stated as the ratio of blocked calls to completed calls

- P01 grade of service means that 1% of calls are blocked

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Review

- Telephone traffic is measured in Erlangs or CCS

- Performance metric for circuit switched networks is the grade of service

- Systems are designed to provide the desired grade of service during the busy hour

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Voice System Design

- Voice systems are designed using a mathematical model developed by A.K. Erlang

$$P_b = \frac{\dfrac{A^N}{N!}}{\displaystyle\sum_{X=0}^{N} \dfrac{A^X}{X!}}$$

Pb – Blocking probability, A – Total traffic, N – Number of circuits

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Erlang B Assumptions

- Number of callers is infinite

- Blocked callers do not retry

- Call arrivals are randomly distributed according to a Poisson distribution

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Other Models

- Extended Erlang B (Jewitt & Shrago)

- Engset Modification (T. Engset)

- Both models require additional information about a system that is not always available.

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Calculator

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Requirements

- Excel 2000 or newer

- Macro security set to medium

- When spreadsheet opens click "Enable Macros" button

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Help

- Spreadsheet contains a brief description of the calculator and the input parameters

- For additional help contact: rparkins@infotel-systems.com

- Website: http://www.infotel-systems.com

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Thank You for Listening

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