

Short-term periodicity of internet traffic

When designing data communication networks or devices for such networks, it is important to understand the nature of the traffic such networks carry. To a large extent, the traffic in the network core is essentially random, being the result of the independent activities of many individual users. Still, some structure can be discerned in this randomness. For example, experiments have shown that the traffic is "self-similar": it looks roughly the same at different timescales. Furthermore, there are obvious 24-hour and 7-day periodicities.

Besides those long-term periodicities, a simple experiment reveals that there are also many short-term periodicities, with periods on the order of seconds or fractions of seconds. Possible causes of such periodicities include network effects (such as round-trip times of connections), and application behaviour.

The goal of this assignment is to study short-term periodicity of network traffic stored in the UT internet traffic repository, using both signal analysis techniques (like the Fourier transform) and trace analysis tools (like Ethereal).

In particular, the following questions should be considered:

- literature search: what previous results on short-term periodicity are available?
- how much of the traffic is essentially periodic?
- what typically causes the periodicities? Network effects (like round-trip delay), or application behaviour?
- what periods are common? Are any particular periods very common, e.g. due to behaviour of certain popular application programs?

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