FRAGILE

Why Do We Have Post-Dialling Delay?

Post-Dialling Delay (PDD) is defined as the time period occurring after the telephone subscriber has completed dialling the required number until the reception of a service tone. The phenomenon of PDD is a side effect of the APO decision to change the telephone network from one based on a step-by-step (SxS) operation to one using common control (Crossbar) equipment with registers and markers. In the SxS system each digit dialled by the subscriber causes each successive switching stage to be set. Hence, the delay between dialling the last digit and the return of a service tone when the last stage is set is minimal and generally in the order of one second or less. The PDD under this condition is considered to be zero.

In the common control system of switching, all digits are dialled into and stored in a register which then uses them to set up the call in the appropriate manner. A PDD is now introduced and is the time taken by the register to switch the call through the subsequent switching stages. PDD in itself is not a problem until it becomes excessive. The subscriber may then interpret it as a 'no progress' call and hang up prior to the switching being completed. PDD will be influenced by the following factors:

- Subscriber speed of dialling.
- Routing pattern.
- Analysis required to determine the Number Length (NL) and
- Type of Terminating Equipment (TOTE).
- The starting point for forward signalling.
- Variations in telephone traffic.
- The number of SxS switching stages traversed.

The main contributing factor to PDD is the number of SxS switching stages traversed by the call in networks having a mixture of crossbar and SxS equipment. The register must regenerate decadic impulses to set the SxS stages at a similar rate as the subscriber would dial them (10 ips. plus nominal interdigital pauses) in a completely SxS call. If the call has to be switched via other common control stages, the register uses a high-speed multi-frequency code (MFC) signalling scheme (7 digits per second) and the delay experienced by the subscriber is reduced. The delay in this case is largely influenced by the prevailing traffic conditions and the routing of the call. The PDD is a minimum when a direct route is used and a maximum when the 'back-bone' route is selected. In the heavier traffic periods the 'back-bone' would be selected for a greater proportion of calls. Complex analysers are used to give the registers information derived from analysis of the dialled number to assist in establishing the call. This information consists of:

- The number of digits that must be stored before the register can start signalling forward and
- When the register can 'ready connect' on calls which are completed by decadic signalling.

This information is generally referred to as Type of Terminating Equipment (TOTE) and Number Length (NL).

On calls which are to be completed via the common control system the register is required to store all digits before commencing to signal forward. Ideally, on calls to be completed via the SxS system with decadic pulsing, the register should commence to start signalling forward as soon as possible. The code analysis can, therefore, influence the PDD, as to achieve the ideal condition on SxS switched calls all codes corresponding to these cases should be analysed to the point where the earliest starting point can be determined. However, due to limitations in the amount of code expansion available, it is sometimes necessary to use later starting points than the ideal, with a consequent increase in PDD. In most instances a compromise is necessary between the amount of analysis and the increase in the average PDD being experienced.

Measurements of the PDD are carried out by the Telecommunications Division during commissioning tests of new exchange equipment and during routine service sampling checks of the network. These measurements are carried out by the following means:

- Manual test calls using a telephone and stopwatch. The acceptable limits for PDD from this test are:
  (a) 80% of test calls to have PDD of less than 8 seconds.
  (b) The remainder of the test calls to have PDD of less than 10 seconds.
- Service assessment of live local and STD traffic. The results of these tests are recorded and analysed under the following categories:
  (a) PDD less than 4 seconds
  (b) PDD less than 9 seconds
  (c) PDD greater than 9 seconds.

The results of these measurements are then forwarded to Engineering for examination and suitable action where the limits are being exceeded.

As step-by-step equipment, last purchased in 1962, represents a steadily decreasing proportion of the total switching equipment in the Australian network, PDD of excessive duration will be experienced infrequently by subscribers in general. However, on particular routes to SxS terminals from crossbar sources, PDD will remain. So, in the future, the only significant reduction in PDD would be effected by the programmes replacement of SxS equipment. Another factor which could reduce PDD in sectors of the network is the introduction of Stored Programme Controlled (SPC) exchanges in both the trunk and local networks whereby the respective processors would exchange the information signals via an extra-highspeed data link using a signalling scheme similar to the proposed CCITT No. 6 Scheme.