

Charpter2

Strowger Switching Systems

Introduction

□ Strowger Switching System

- The first automatic Switching System
- Inventor: Almon B. Strowger
- Year: 1889

□ Advantages

- Language independent (Standard)
 - High degree of privacy (Security)
 - Fast establishment/release (Efficient)
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Automatic Switching System

Overcoming the disadvantages of Manual Switching systems, the Automatic Switching systems come with the following advantages –

- ☐ Language barriers will not affect the request for connection.
- ☐ Higher degree of privacy is maintained.
- ☐ Faster establishment and release of calls is done.
- ☐ Number of calls made in a given period can be increased.
- ☐ Calls can be made irrespective of the load on the system or the time of the day.

- The **Strowger Switching system** is also called the step-by-step switching system as the connections are established in a **step-by-step** manner.

Signaling Tones

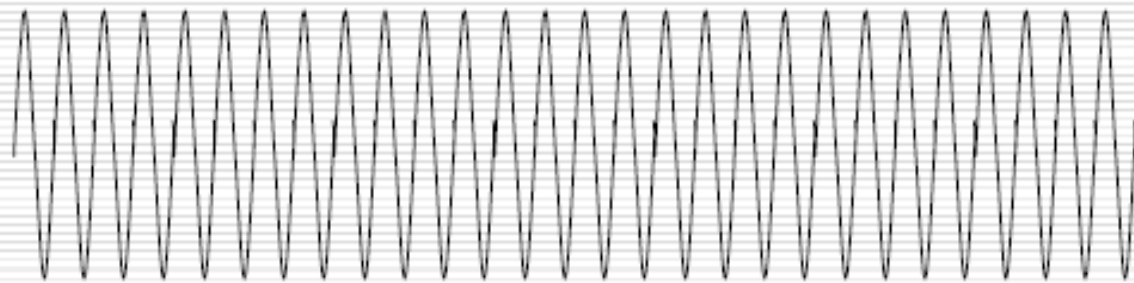
□ Functions of Signaling Tones

- Respond to the calling subscriber to obtain the identification of the called subscriber (**Dial Tone**)
 - Inform the calling subscriber that the call is being established (**Call in Progress Tone**)
 - Ring the called party (**Ring Tone**)
 - Inform the calling subscriber if the called party is busy (**Busy Tone**)
 - Inform the calling subscriber if the called party is unobtainable for some reason (**Number Unobtainable Tone**)
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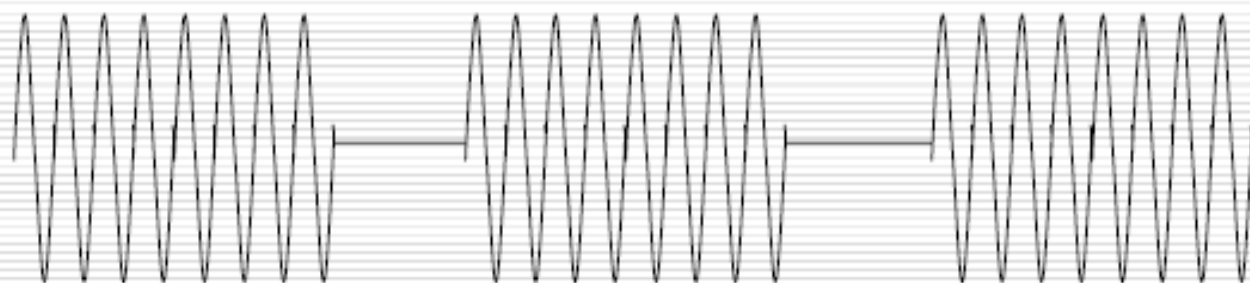
Dial Tone

- The dial tone is the signaling tone, which indicates that the exchange is ready to accept the dialed digits from the subscriber. The number should be dialed only when this signal is heard. Otherwise, the digits dialed before this signal will not be considered. This will lead to the dialing of a wrong number.
- The dial tone is generally a 33 Hz or 50 Hz or 400 Hz continuous tone as shown below.

□ Dial Tone (33Hz/50Hz/400Hz)



□ Call in Progress Tone (400Hz/800Hz)



0.5S

2.5S

0.5S

Call in progress tone

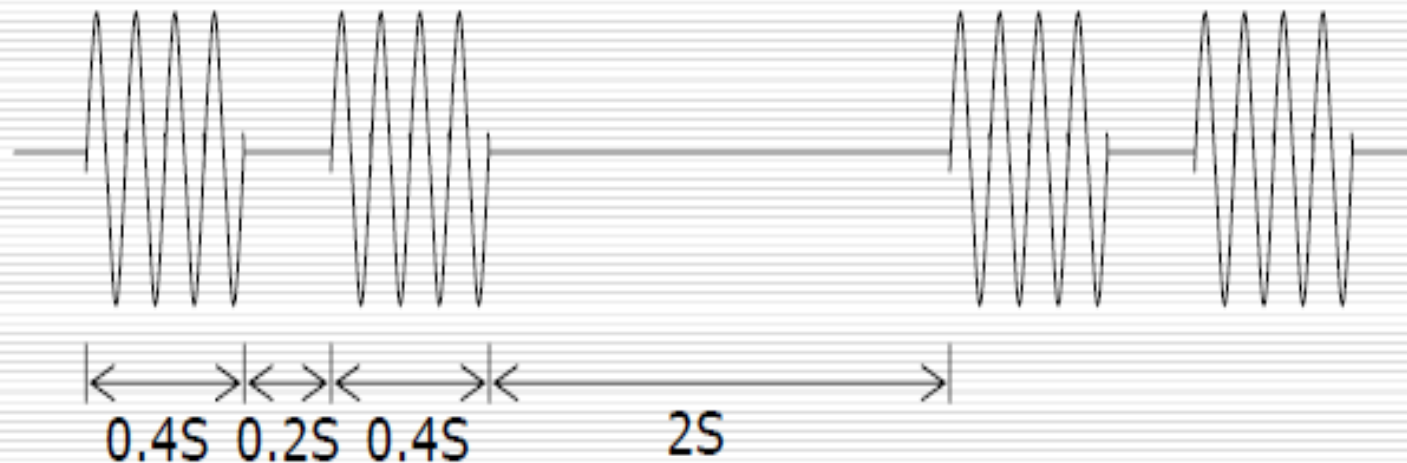
When a subscriber call is routed through a number of different types of exchanges, one hears different call-in-progress tones as the call progresses through different exchanges. This signal has different patterns in different systems.

- In electromechanical systems, it is usually 800Hz and 0.5s ON/OFF period.
- In analog electronic exchanges, it is a 400Hz pattern with 0.25s ON period and 0.5s OFF period.
- In digital exchanges, it is 400Hz signal with 0.1s ON/OFF periods.

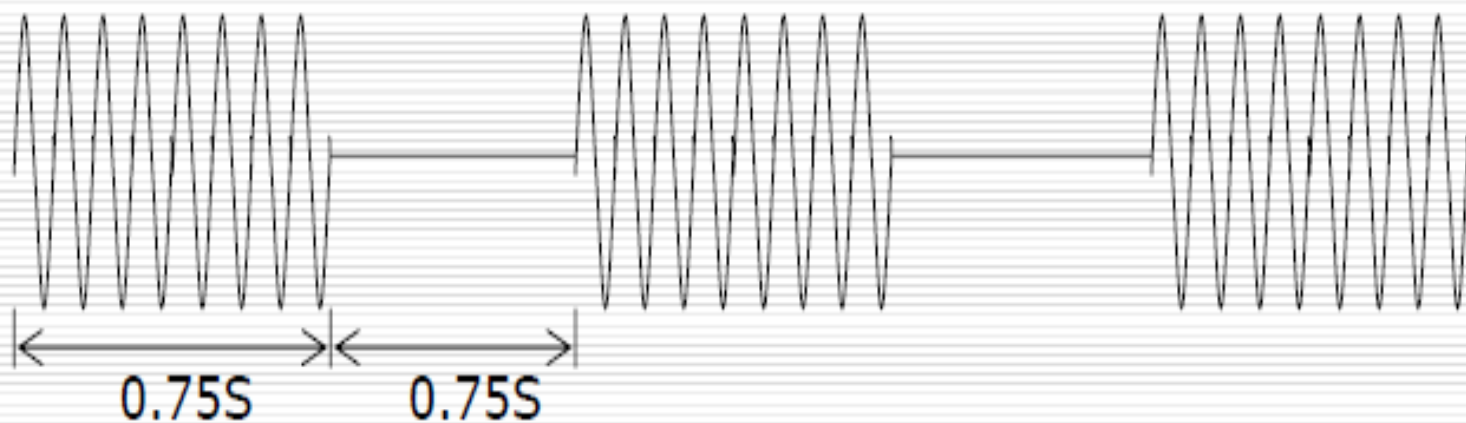
Ring Tone

- After dialing the number of the called party, when the line of the called party is obtained, the exchange control equipment sends out the ringing current to the telephone set of the called party, which is a familiar double-ring pattern.
- Simultaneously, the control equipment sends out a ringing tone to the calling subscriber, which has a pattern similar to that of the ringing current. The two rings double-ring pattern are separated by a time gap of 0.2s and two double-ring patterns by a gap of 2s, as shown in the below figure.

□ Ringing Tone (400Hz/133Hz)



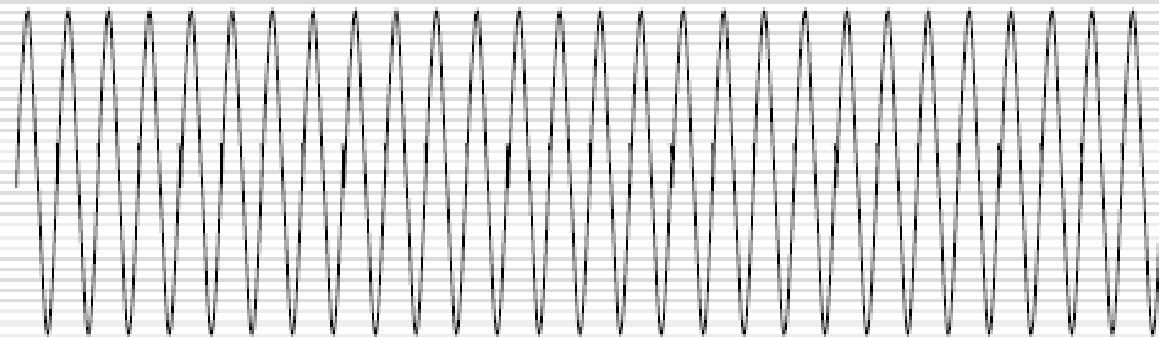
□ Busy Tone (400Hz)



Busy Tone

- After dialing the required number, if the called subscriber or the lines at the exchange are not free to place a call, the calling subscriber is sent a busy tone indicating that the lines or the subscriber is busy; this is called a busy tone.
- A busy tone of 400Hz signal with silence period in between. The burst and silence durations have the same value of 0.75s or 0.75s.

□ Number Unobtainable Tone (400Hz)



Number Unobtainable Number

- If the called party is out of order or disconnected or if an error in dialing leads to the selection of a spare line, such a situation is indicated using a continuous 400Hz signal, called as Number Unobtainable tone. The following illustration shows a continuous 400Hz signal.

☐ Subscriber Identification

- How to identify the subscribers?
- Manual Switching System:
 - ☐ Name/Department/Office
- Automatic Switching System:
 - ☐ Numbering Plan

☐ How to transfer Identity?

- Pulse dialing
 - Multi-frequency dialing
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Dialing

- Unlike in Manual Switching system, an automatic switching system requires a formal numbering plan or addressing scheme to identify the subscribers. Numbering plan is where a number identifies a subscriber, is more widely used than the addressing scheme in which a subscriber is identified by the alpha numerical strings. So, there needs to be a mechanism to transmit the identity of the called subscriber to the exchange.
- This mechanism should be present in the telephone set, in order to connect the call automatically to the required subscriber. The methods prevalent for this purpose are **Pulse Dialing** and **Multi Frequency** Dialing. Of them, the Pulse dialing is the most commonly used form of dialing till date.

Pulse Dialing

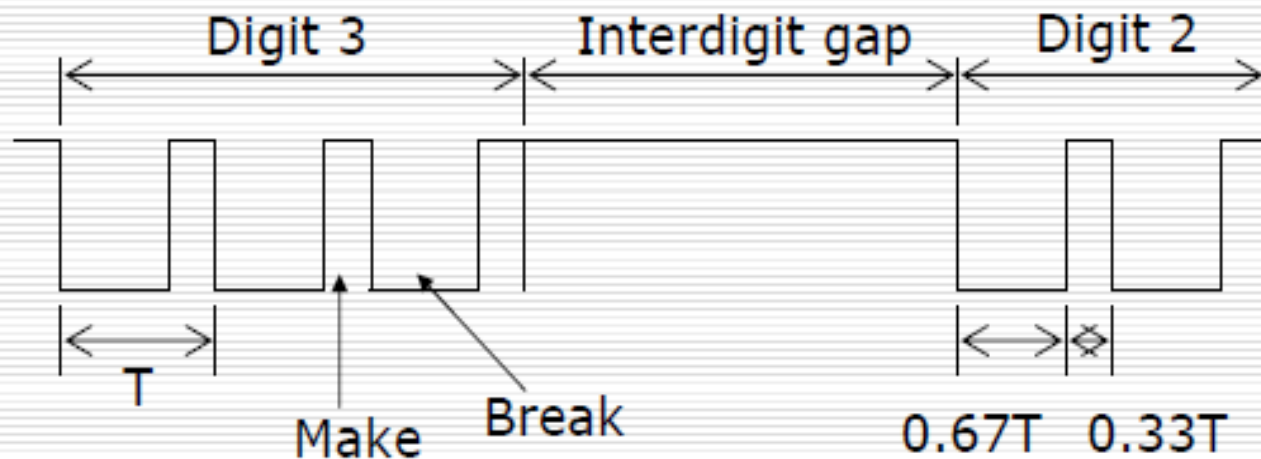
The digits that are used to identify the subscribers are represented by a train of pulses. The number of pulses in a train is equal to the digit value it represents except in the case of zero, which is represented by 10 pulses. Successive digits in a number are represented by a series of pulse trains. These pulses have equal number of time intervals and the number of pulses produced will be according to the number dialed.

Two successive trains are distinguished from one another by a pause in between them, known as the **Inter-digit gap**.

Rotary Dial Telephone

□ Pulse dialing

- A train of pulses is used to represent a digit in the subscriber number
- Successive Digits are distinguished by a pulse (interdigit gap)



Rotary Dialing

- The dial is operated by placing the finger in the hole appropriate to the digit to be dialed. Now, drawing the fingerplate round in the clockwise direction to the finger stop position and letting the dial free by withdrawing the finger, makes a number dialed. The fingerplate and the associated mechanism now return to the rest position under the influence of a spring. The dial is ready for the next number.

Strowger Switching System

