

# Telecommunication Systems Engineering

## Introduction to Analog Telephony Concepts

### PTCL ADEs Training

#### *Establishing A Call (Conventionally)*

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1. Calling customer takes phone off hook which closes the circuit to the C.O. ("looping the circuit").
2. C.O. detects the "loop" and indicates readiness with dial tone.
3. Calling customer hears dial tone and dials number.
  - The network converts ("translates") the phone number to a physical equipment address
4. The network checks on the called party status and decides on a routing for the connection.
5. If connection possible, the called party is alerted.
  - Large 20 Hz alternating current is applied to line ("ringing current").
6. "Ring tone" is returned to the caller.
7. The called party picks up the handset and closes his/her loop.
8. Exchange detects second loop and "trips" or stops ringing, then establishes call.
9. One party opens loop by hanging up, and exchange clears connection.

## ***Loop and Disconnect Signalling***

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**"pulse dialling" :**

- Line is rapidly disconnected and reconnected in sequence with one pulse for digit value "1", two pulses for digit value "2", etc.
- Each pulse lasts 0.1 second.
- Inter-digit pause (IDP) must be >0.5 second.
  - If not, current digit may combine with previous digit.
- Ten digit phone number typically takes 6-15 seconds total.
- This is the kind of signalling old "rotary dial" phones produced.

## ***Dual-Tone Multi-Frequency Signalling***

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**DTMF signalling" or "tone signalling".**

- Faster than pulse dialling (1-2 seconds for ten digit number).
  - Reduces call set-up time.
- Each digit produced by combination of 2 pure frequency tones.
  - Reduces chances of error or interference.

		High Frequency Tone			
		1208 Hz	1336 Hz	1477 Hz	1633 Hz
Low Frequency Tone	697 Hz	<b>1</b>	<b>2</b>	<b>3</b>	<b>spare</b>
	770 Hz	<b>4</b>	<b>5</b>	<b>6</b>	<b>spare</b>
	852 Hz	<b>7</b>	<b>8</b>	<b>9</b>	<b>spare</b>
	941 Hz	<b>*</b>	<b>0</b>	<b>#</b>	<b>spare</b>

