

# 1 Background

## Analog

Tip	
Ring	
On-hook	
Home-style, where 48volts flows on call & answer	
PBX-style, no dial tone until tip & ring momentarily shorted to zero	
Problem with home-style, receive when lift to call	

## Digital

TDM	
DS0	
T1	
E1	
CAS	
CCS	
Q.931	
RBS	
Time-slot used in T1 for non-audio overhead	
Time-slot used in E1 for non-audio overhead	
Which bits used for in-band	
SS7	
E.164	
NANP	
MAC	
Nyquist	
Quantization	
MOS	
RTCP	
RTP	

### Frequencies

Hearing	Speech	Phone

### Uncompressed Digital Phone Audio

Bits per Sample	Samples per Second	Total Bits / Second	Highest Frequency

### Codecs

Codec	Bandwidth	MOS
G.711		
G.729		
G.729a		

### Codec Complexity

High Medium

G.711		
G.729		
G.729a		
G.729ab		
G.729b		
iLBC		

### VoIP Benefits


USA & Japan MSB 1 = negative

G.711 $\mu$ -law		
G.711 A-law		

### Call Signaling and Media Flows

Purpose of RTCP	
Purpose of RTP	
RTP Port	
RTCP Port	
RTP OSI Layer	
RTP Provides:	