

# Important Cellular Concepts Formulas PDF



## Formulas Examples with Units

### List of 16 Important Cellular Concepts Formulas

#### 1) Average Calling Time Formula ↻

Formula

$$T_{\text{avg}} = \frac{A \cdot 60}{Q_i}$$

Example with Units

$$200_s = \frac{60 \cdot 60}{18}$$

Evaluate Formula ↻

#### 2) Bandwidth Efficiency Formula ↻

Formula

$$\eta_{\text{BW}} = \frac{R_b}{\text{BW}}$$

Example with Units

$$0.6943 = \frac{48.6 \text{ kbps}}{70 \text{ kHz}}$$

Evaluate Formula ↻

#### 3) Bandwidth of M-Ary PSK Formula ↻

Formula

$$\text{BW}_{\sqrt{M}} = \frac{2 \cdot f_b}{B_{\text{sym}}}$$

Example with Units

$$30 \text{ kHz} = \frac{2 \cdot 120 \text{ kbps}}{8 \text{ bits}}$$

Evaluate Formula ↻

#### 4) Cell Radius Formula ↻

Formula

$$r = \frac{D}{Q}$$

Example with Units

$$2.9074 \text{ km} = \frac{9.42 \text{ km}}{3.24}$$

Evaluate Formula ↻

#### 5) Co-Channel Interference Formula ↻

Formula

$$Q = \frac{D}{r}$$

Example with Units

$$3.2483 = \frac{9.42 \text{ km}}{2.9 \text{ km}}$$

Evaluate Formula ↻

#### 6) Distance between Co-Channel Cells Formula ↻

Formula

$$D = \left( \sqrt{3 \cdot K} \right) \cdot r$$

Example with Units

$$9.3971 \text{ km} = \left( \sqrt{3 \cdot 3.5} \right) \cdot 2.9 \text{ km}$$

Evaluate Formula ↻



## 7) Frequency Reuse Distance Formula

Formula

$$D = Q \cdot r$$

Example with Units

$$9.396 \text{ km} = 3.24 \cdot 2.9 \text{ km}$$

Evaluate Formula 

## 8) Hamming Distance Formula

Formula

$$d = 2 \cdot t + 1$$

Example

$$15 = 2 \cdot 7 + 1$$

Evaluate Formula 

## 9) Maximum Calls per Hour per Cell Formula

Formula

$$Q_i = \frac{A \cdot 60}{T_{\text{avg}}}$$

Example with Units

$$18 = \frac{60 \cdot 60}{200 \text{ s}}$$

Evaluate Formula 

## 10) New Cell Area Formula

Formula

$$A_{\text{cn}} = \frac{A_{\text{co}}}{4}$$

Example with Units

$$16 \text{ km}^2 = \frac{64 \text{ km}^2}{4}$$

Evaluate Formula 

## 11) New Cell Radius Formula

Formula

$$r_{\text{cn}} = \frac{r_{\text{co}}}{2}$$

Example with Units

$$4.5 \text{ km} = \frac{9 \text{ km}}{2}$$

Evaluate Formula 

## 12) New Traffic Load Formula

Formula

$$TL_N = 4 \cdot TL_0$$

Example

$$20 = 4 \cdot 5$$

Evaluate Formula 

## 13) Offered Load Formula

Formula

$$A = \frac{Q_i \cdot T_{\text{avg}}}{60}$$

Example with Units

$$60 = \frac{18 \cdot 200 \text{ s}}{60}$$

Evaluate Formula 

## 14) Old Cell Area Formula

Formula

$$A_{\text{co}} = A_{\text{cn}} \cdot 4$$

Example with Units

$$64 \text{ km}^2 = 16 \text{ km}^2 \cdot 4$$

Evaluate Formula 

## 15) Old Cell Radius Formula

Formula

$$r_{\text{co}} = r_{\text{cn}} \cdot 2$$

Example with Units

$$9 \text{ km} = 4.5 \text{ km} \cdot 2$$

Evaluate Formula 



## 16) Traffic Load Formula

Evaluate Formula 

Formula

$$TL_0 = \frac{TL_N}{4}$$

Example







$$5 = \frac{20}{4}$$



## Variables used in list of Cellular Concepts Formulas above

- **A** Offered Load
- **A<sub>cn</sub>** New Cell Area (Square Kilometer)
- **A<sub>co</sub>** Old Cell Area (Square Kilometer)
- **B<sub>sym</sub>** Number of Bits per Symbol (Bit)
- **BW** Bandwidth (Kilohertz)
- **BW<sub>√M</sub>** M-Ary PSK Bandwidth (Kilohertz)
- **d** Hamming Distance
- **D** Frequency Reuse Distance (Kilometer)
- **f<sub>b</sub>** Transmitting Frequency (Kilobit per Second)
- **K** Frequency Reuse Pattern
- **Q** Co Channel Reuse Ratio
- **Q<sub>i</sub>** Maximum Calls Per Hour Per Cell
- **r** Radius of Cell (Kilometer)
- **R<sub>b</sub>** Data Rate (Kilobit per Second)
- **r<sub>cn</sub>** New Cell Radius (Kilometer)
- **r<sub>co</sub>** Old Cell Radius (Kilometer)
- **t** Capability of Error Correction Bits
- **T<sub>avg</sub>** Average Calling Time (Second)
- **TL<sub>N</sub>** New Traffic Load
- **TL<sub>O</sub>** Old Traffic Load
- **η<sub>BW</sub>** Bandwidth Efficiency

## Constants, Functions, Measurements used in list of Cellular Concepts Formulas above


- **Functions:** **sqrt**, sqrt(Number)  
*A square root function is a function that takes a non-negative number as an input and returns the square root of the given input number.*
- **Measurement: Length** in Kilometer (km)  
*Length Unit Conversion* 
- **Measurement: Time** in Second (s)  
*Time Unit Conversion* 
- **Measurement: Area** in Square Kilometer (km<sup>2</sup>)  
*Area Unit Conversion* 
- **Measurement: Frequency** in Kilohertz (kHz)  
*Frequency Unit Conversion* 
- **Measurement: Data Storage** in Bit (bits)  
*Data Storage Unit Conversion* 
- **Measurement: Data Transfer** in Kilobit per Second (kbps)  
*Data Transfer Unit Conversion* 



## Download other Important Wireless Communication PDFs

- [Important Cellular Concepts Formulas](#) 
- [Important Frequency Reuse Concept Formulas](#) 
- [Important Data Analysis Formulas](#) 
- [Important Mobile Radio Propagation Formulas](#) 
- [Important Data Transmissions and Error Analysis Formulas](#) 

## Try our Unique Visual Calculators

-  [Percentage change](#) 
-  [LCM of two numbers](#) 
-  [Proper fraction](#) 

Please SHARE this PDF with someone who needs it!

## This PDF can be downloaded in these languages

[English](#) [Spanish](#) [French](#) [German](#) [Russian](#) [Italian](#) [Portuguese](#) [Polish](#) [Dutch](#)

7/8/2024 | 12:20:26 PM UTC

