



# Next G Connect (NGC)

# Transmit Power (ERP/EIRP)

Aug 1 2019

# Transmit Power

---

- The transmit power for any radio system is how much energy is being transmitted from the antenna system either for a communication site, access point or edge device.
- Transmitter power is a key attribute of a radio system.
- The transmit power emitted directly determines the range or distance the radio link can maintain adequate communication.
- The range of the radio system is a function of total power emitted from the site minus any pathloss factors prior to reaching at the destination receiver.

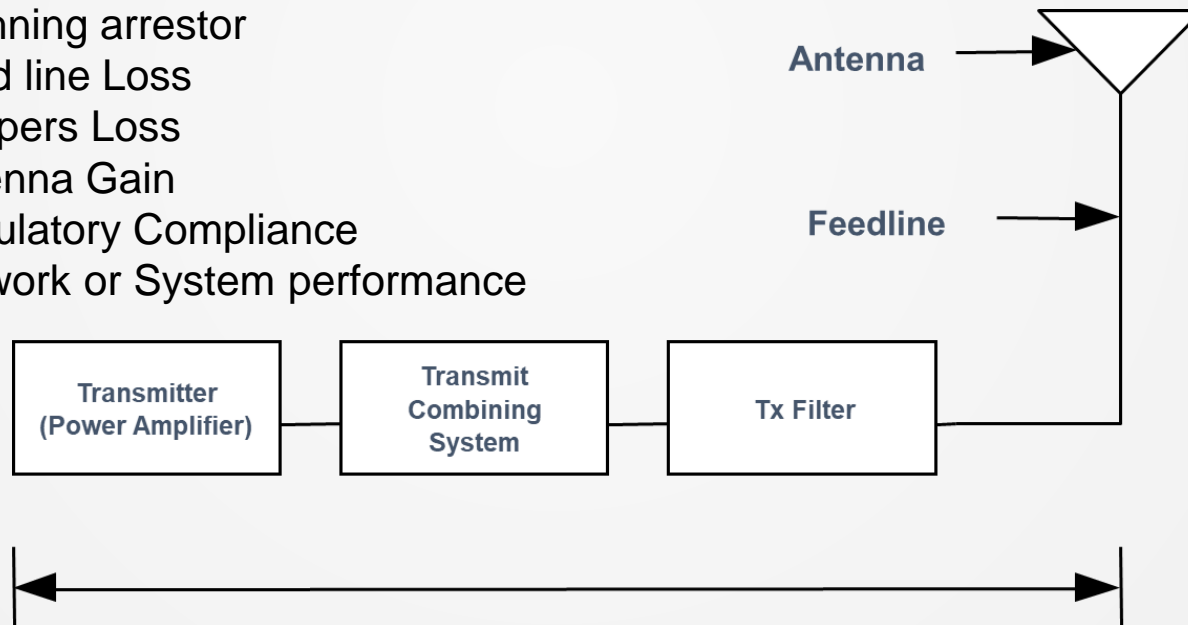
# Radiated Transmit Power Calculation

---

- Transmitter power is expressed in watts.
- However transmit power is calculated as either:
  - ERP - effective radiated power relative to a dipole radiator
  - EIRP - effective radiated power relative to a isotropic radiator
- $EIRP = ERP + 2.14dB$

# Transmit Power Components

- There are many components that are required for the radio system properly transmit.
- The primary components contributing to the transmit power are:
  - Power Amplifier Output
  - Combining Loss
  - Filter Loss
  - Lightning arrestor
  - Feed line Loss
  - Jumpers Loss
  - Antenna Gain
  - Regulatory Compliance
  - Network or System performance



**Transmit Path Components**

# Calculating Transmit Power

---

Calculating the transmit power of a radio system whether it is a communication site or a edge device involves including all the components which add or subtract energy from the amplifier to the antenna.

If a component adds transmit power it is referred to as gain.

If the component subtracts or removes transmit power it is referred to as a loss.

All the components affecting the gain or loss of the RF signal from the amplifier to the antenna need to be converted to dB before they can added or subtracted accordingly.

# Calculating Transmit Power

- In this example the power amplifier can emits 25Watts of power.
- However Watts needs to be converted to dB or rather dBm.
- 1dBm = 0.001Watt.
- $\text{dB} = 10\log (\text{Watts}/.001)$   
 $= 10\log (44/.001)$   
 $= 43.979$   
or 44dBm
- And the total power radiated from the antenna is 50dBm.
- However dBm is not ERP or EIRP.

Component		Value	Scale
Power Amplifier	25 Watts	44	dBm
Combing Loss		(3)	dB
Filter Loss		(0.3)	dB
Lightning Arrestor		(0.2)	dB
Feedline	150 ft @ 1db/100 ft	(1.5)	dB
Jumper Loss's		(1)	dB
Antenna Gain		12	dBd
Total		50	dBm

## Calculating ERP/EIRP

---

- To calculate ERP/EIRP dB or rather dBm needs to be converted to Watts.
- The total power radiated from the antenna is 50dBm.

$$\text{dB} = 10\log (\text{Watts}/0.001)$$

$$50\text{dBm} = 10\log (\text{Watts}/0.001)$$

$$5 \text{ dB} = \log (\text{Watts}/0.001)$$

Performing Anti-log

$$100000 = (\text{Watts}/0.001)$$

$$\text{Watts} = 100$$

- Since it is relative to a dBd (antenna) this is
  - ERP = 100Watts
- However if the antenna was dBi then the total power would be
  - 52.14dBm
  - ERIP = 164 Watts.

## NGC (Who we are)

---

NGC is a consulting team of highly skilled and experienced professionals. Our background is in wireless communications for both the commercial and public safety sectors. The team has led deployment and operations spanning decades in the wireless technology. We have designed software and hardware for both network infrastructure and edge devices from concept to POC/FOA.

Our current areas of focus include 4G/5G. IoT and security.

The team has collectively been granted over 160 patents in the wireless communication space during their careers. We have also written multiple books used extensively in the industry on wireless technology and published by McGraw-Hill.

Feel free to utilize this information in this presentation with the simple request you reference its origin.

If you see something that should be added, changed or simply want to talk about your potential needs please contact us at [info@nextgconnect.com](mailto:info@nextgconnect.com) or call us at 1.845.987.1787.



Thank you

If you want to know more please contact us at  
[info@nextgconnect.com](mailto:info@nextgconnect.com)