Must-Knows before using an RF detector

Cell phone detector is a device for detecting if there is a radio signal transmitted to a base station from a cell phone in the vicinity.

Cell phone signal propagation is not as straightforward as people think. It is not as ideal as 1 + 1 = 2. We need to be familiar with some basic RF properties to operate a cell phone detector properly.

* At the same location (a distance from a cell phone), received signal strength can vary with respect to time.

* At the same time, received signal changes with respect to Distance.

On average(over tens of seconds):

* At outdoor area, doubling the distance will attenuate the signal strength by 6dB. In other word, the strength will be reduced down to only ¼.

* In indoor area, doubling the distance will attenuate the signal strength by 4.5dB; i.e., reduced down to 1/3 of the strength.

In Radio Frequency (RF) world, Signal Strength is usually expressed by dBm, in order to cover a gigantic variation range.

Signal Strength:

dBm	mW(mini-Watts)
20	100
10	10
3	2
0	1
-3	0.5
-10	0.1
-20	0.01
-30	0.001
-40	0.0001
-50	0.00001
-60	0.000001
-70	0.0000001

Using dBm can save many zeros and is more align with our nature world.

Generally speaking, cell phone should receive a signal strength from a base station at about -85 dBm, or 0.0000000038 mW.

The cell phone, on the other hand, will transmit signal with a strength strong enough to be captured by a base station at about -85dBm too.

In summary:

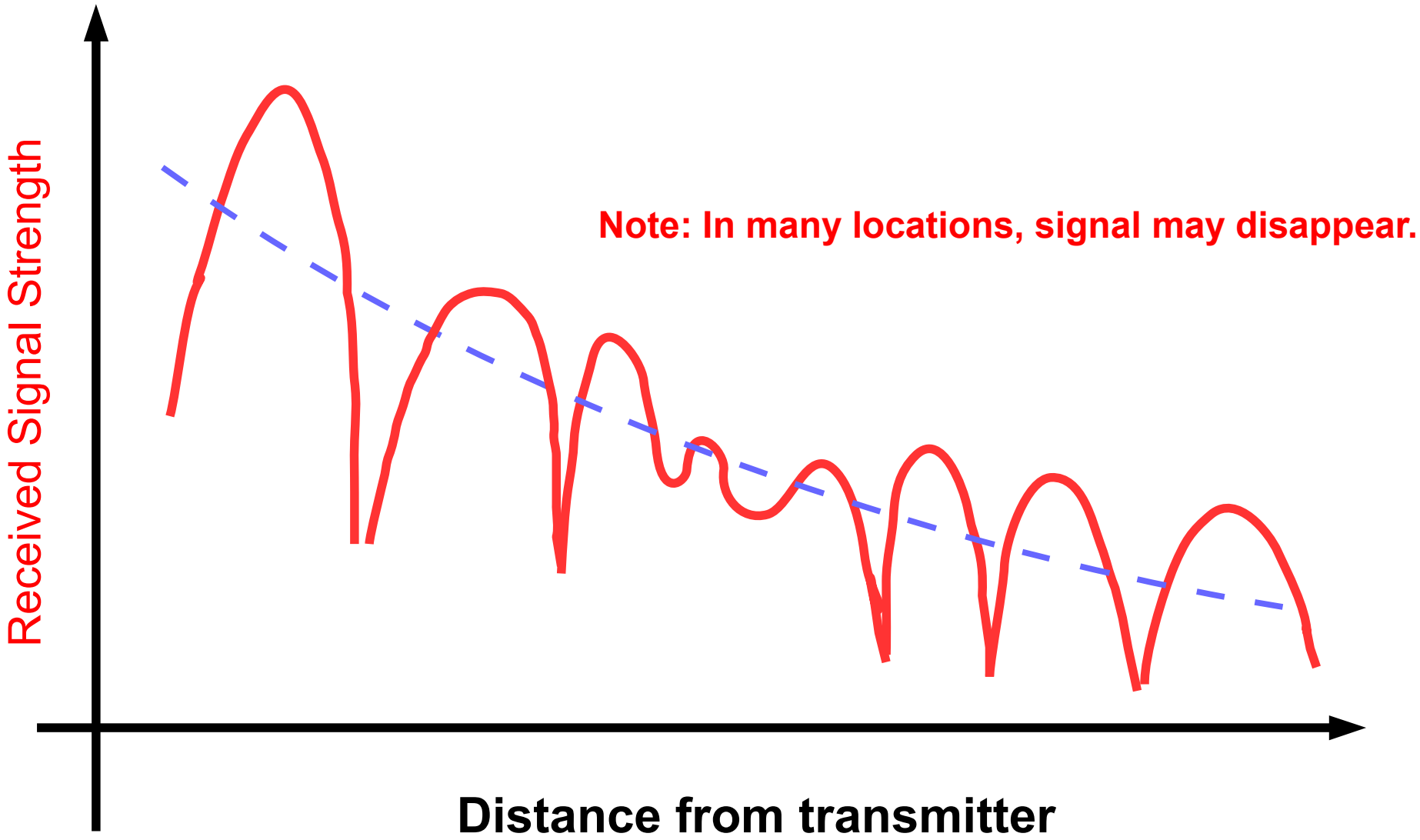
On average (over several tens of seconds):

* At outdoor area, every doubling of a distance reduces the signal strength by about 6dB.

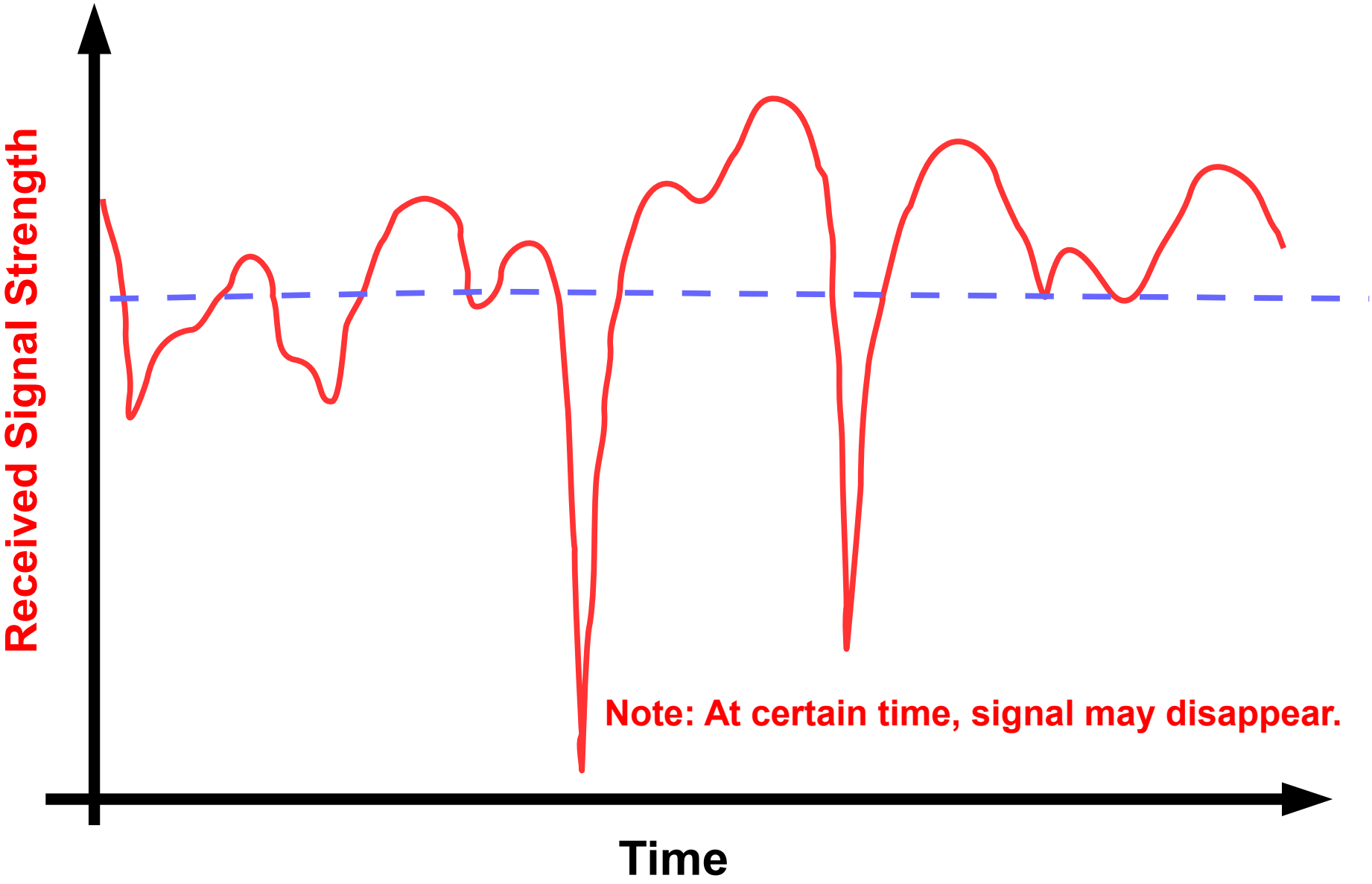
* In indoor space, every doubling of distance reduces the signal strength by about 4.5dB.

The signal transmitted from a cell phone will reduce from about 20dBm to -50 or -60 dBm at 10 or 20 meters away. In other words, it reduces to only 1 millionth of the original strength.

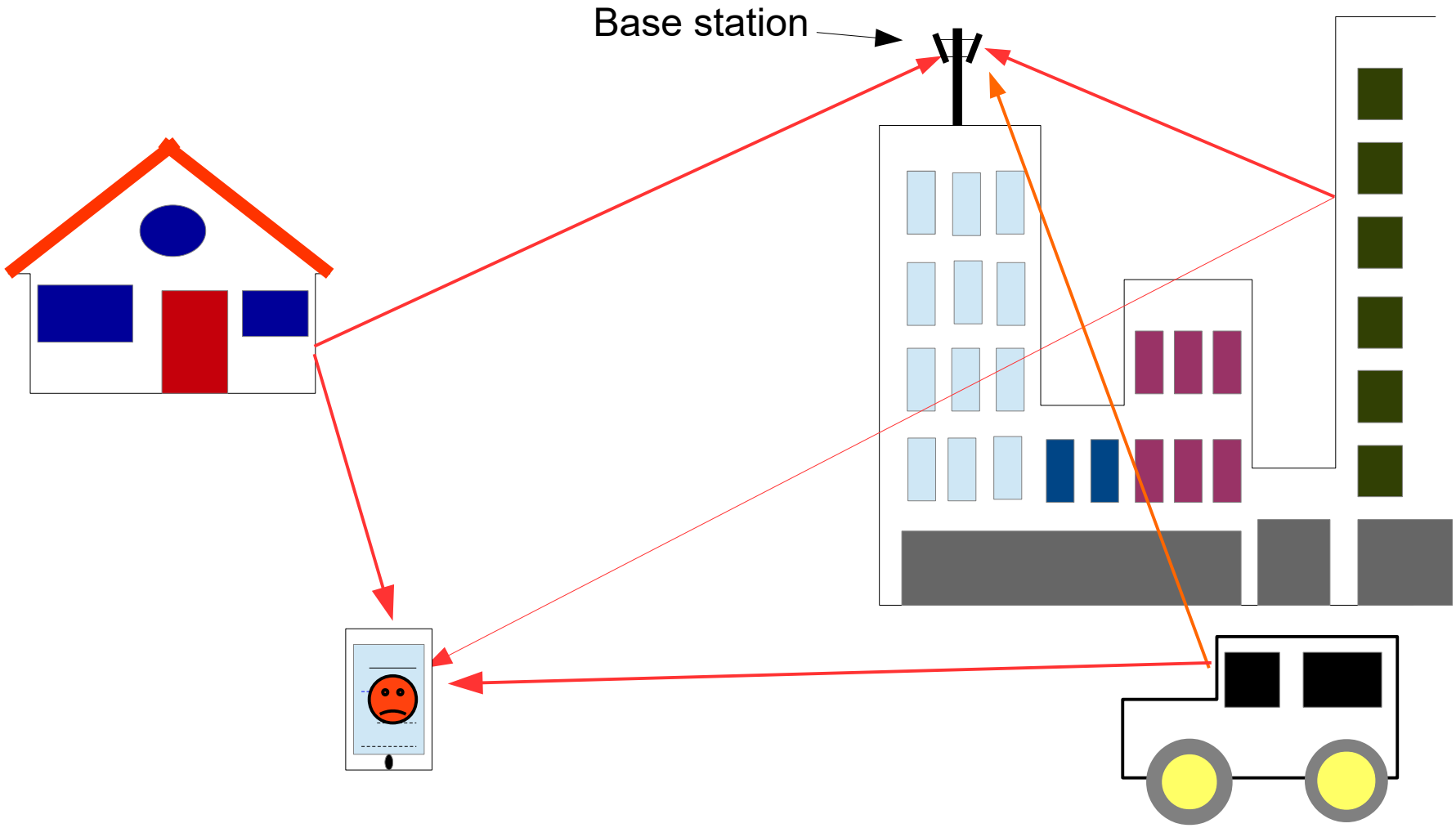
*** At the same moment, the received signal reduces with respect to distance but not following a smooth curve.**



At the same location, the received signal strength may varies with respect to time.

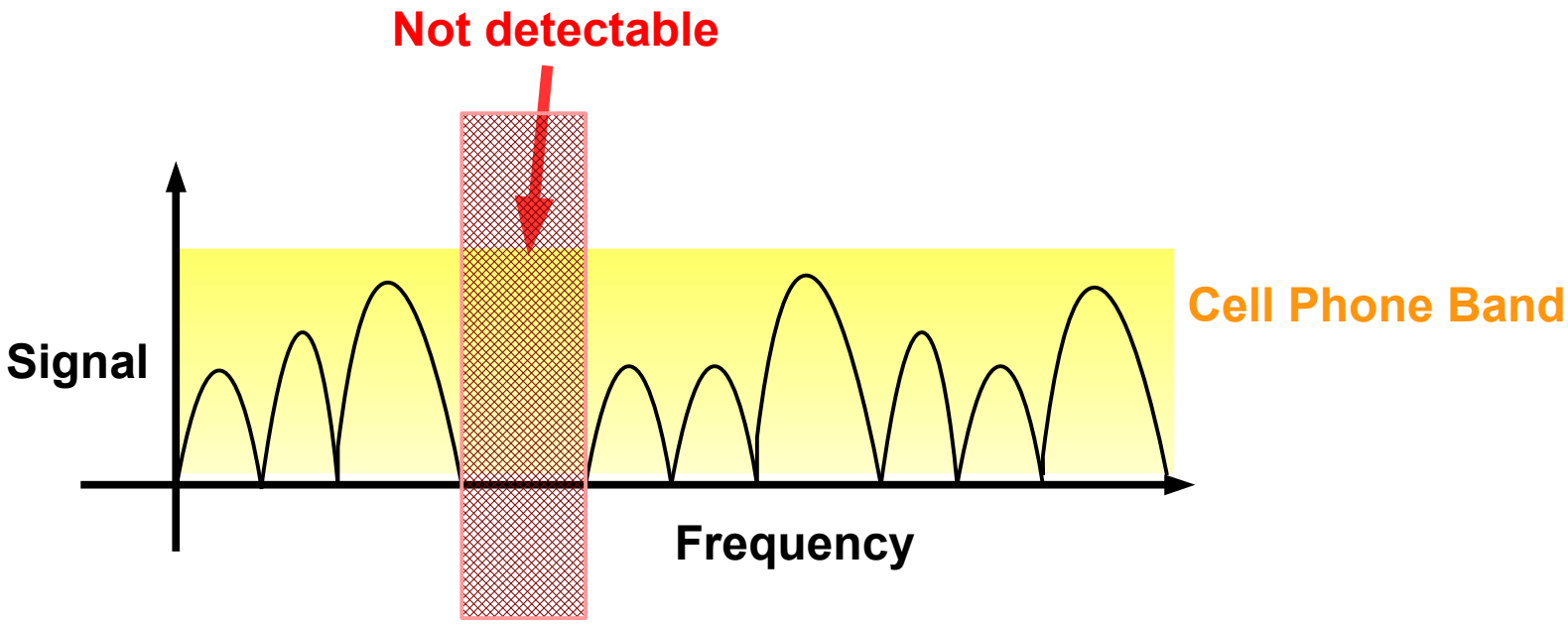


These variations are all caused by reflections. Reflections can either enhance or cancel the received signal. It also is frequency dependent.



In large cities, these phenomena will be more serious.

Therefore, it can create a situation that at certain time, or at certain location, if people are nearby or not, the detector can not detect a signal transmitted from a cell phone happens to transmitted at the frequency that has serious cancellation. Cell phone detector can not function properly under this condition.



In addition, cell phone antenna is somewhat directional.

The user usually is not stationary, signal transmitted toward the detector can therefore varies to a degree that can cause trouble for detector to detect.

With all these understandings, users should expect to experience certain degree of difficulties in using a cell phone detector!

It requires lots of practice to become a master.

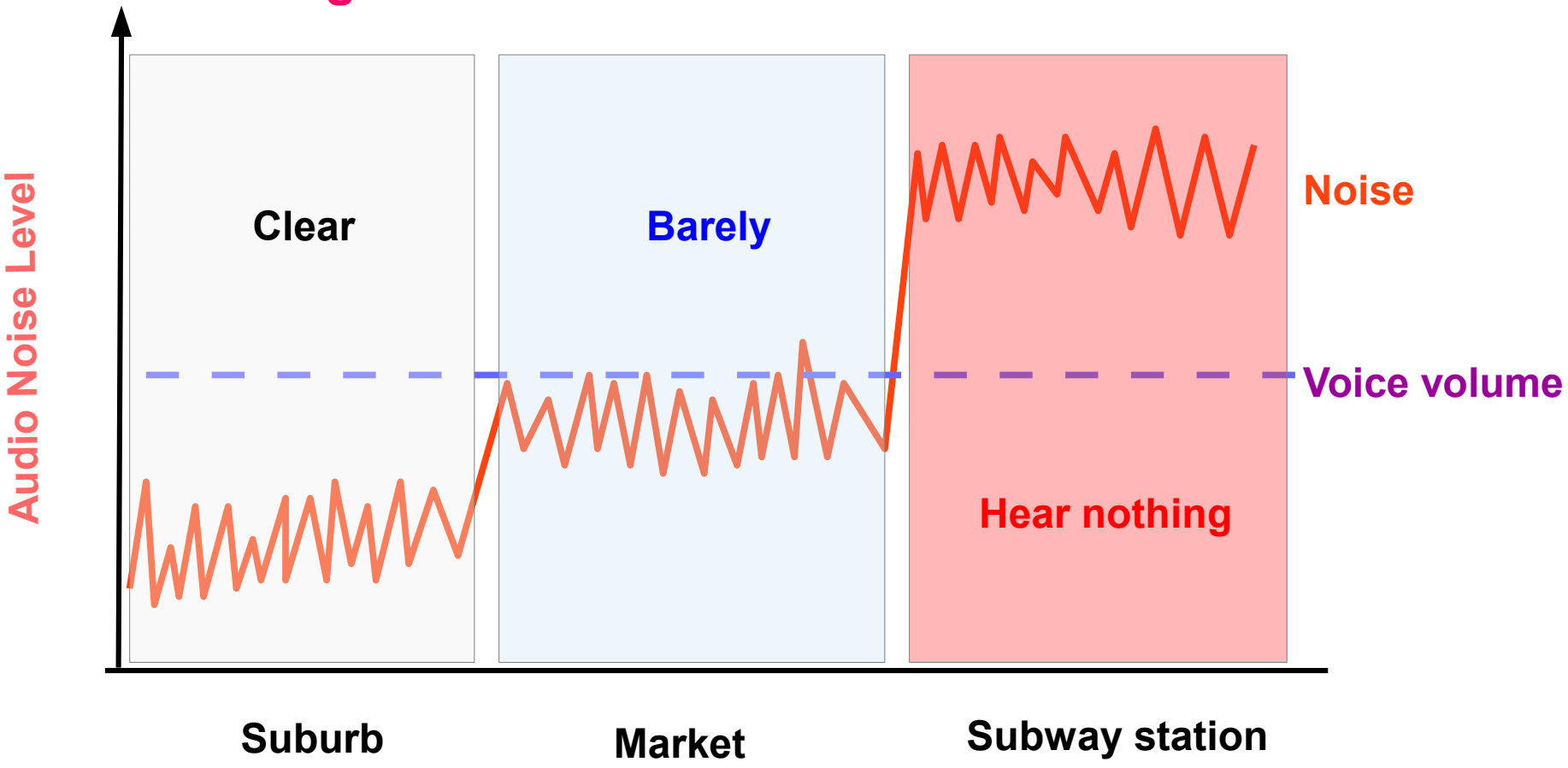
Before

Setting Up a Cell Phone Detector

Understand RF Noise Level

We are in a Noisy World! Speaking at the same loudness, we barely can hear conversation from the person in front of us in a restaurant, or in a subway station. However, we can hear people's murmuring from a far distance in suburb.

This is because the sound noise level in a subway station is much higher than in the suburb.



Similarly, Our World is also contaminated by Radio Frequency emissions. RF Noise is everywhere.

The degree of contamination varies with respect to time, location, and frequency.

City is more serious then Suburb.

Factory is worse than school.

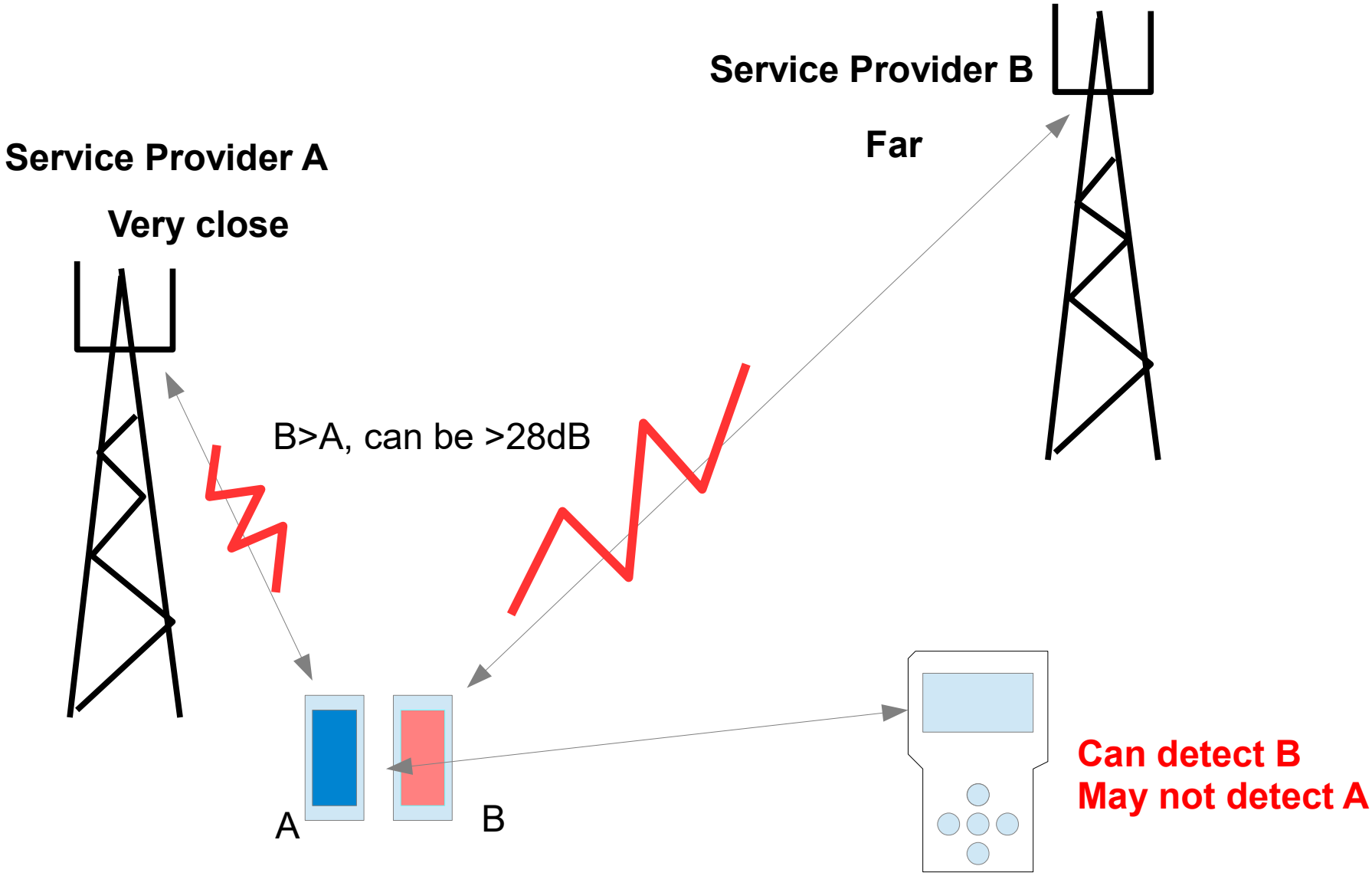
Living room is worse than bathroom.

Office is more serious than farm house.

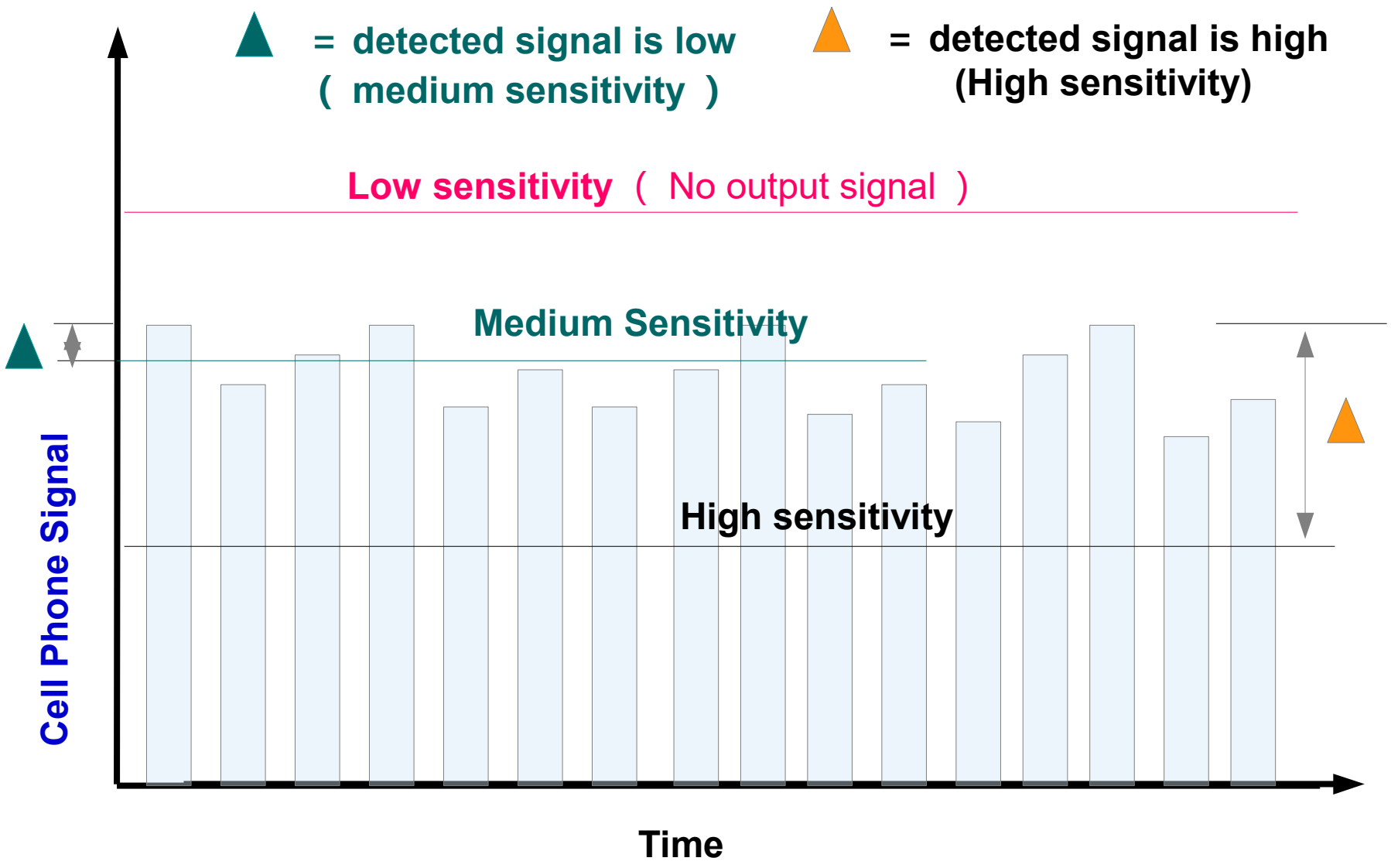
Our cell phone detector can only capture the signal above the noise floor.

In cellphone frequency bands, the noise level are strongly related to the distribution of base stations.

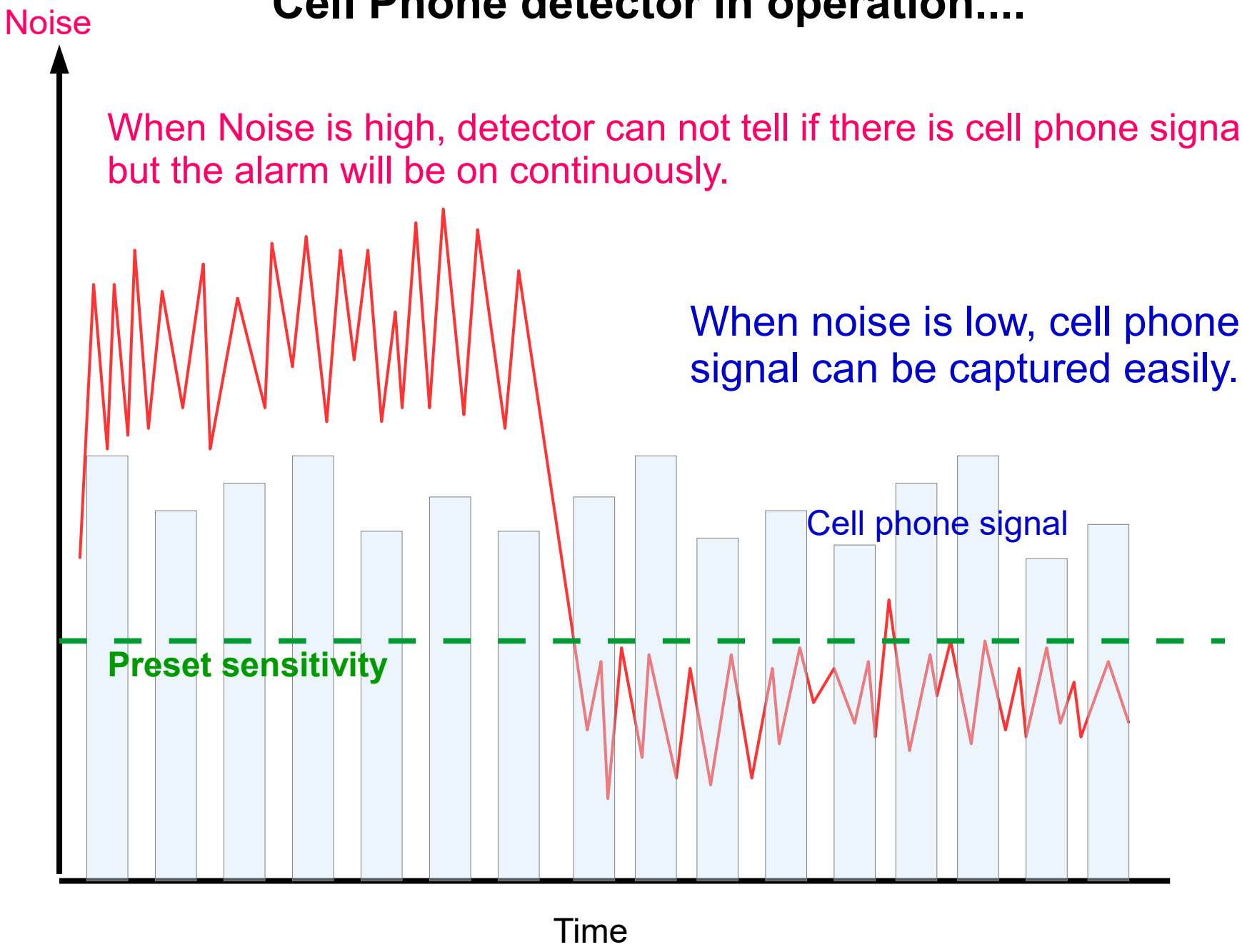
At the same location, the power transmitted from a cell phone is dependent with the location of the base stations. To reach a farther base station, it will need higher power.



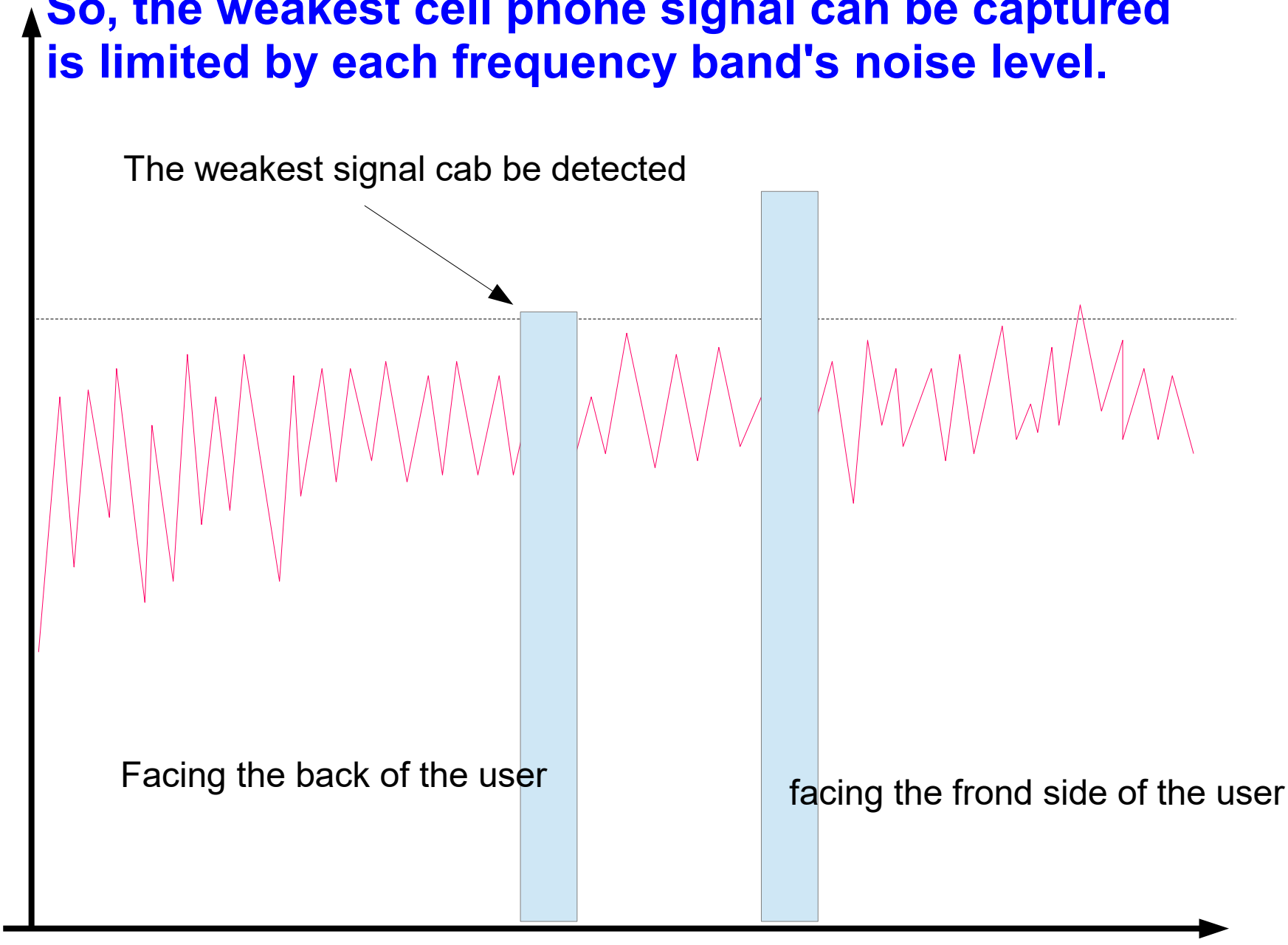
Sensitivity means the lowest signal level can be detected (distinguishable from Noise)



Cell Phone detector in operation....

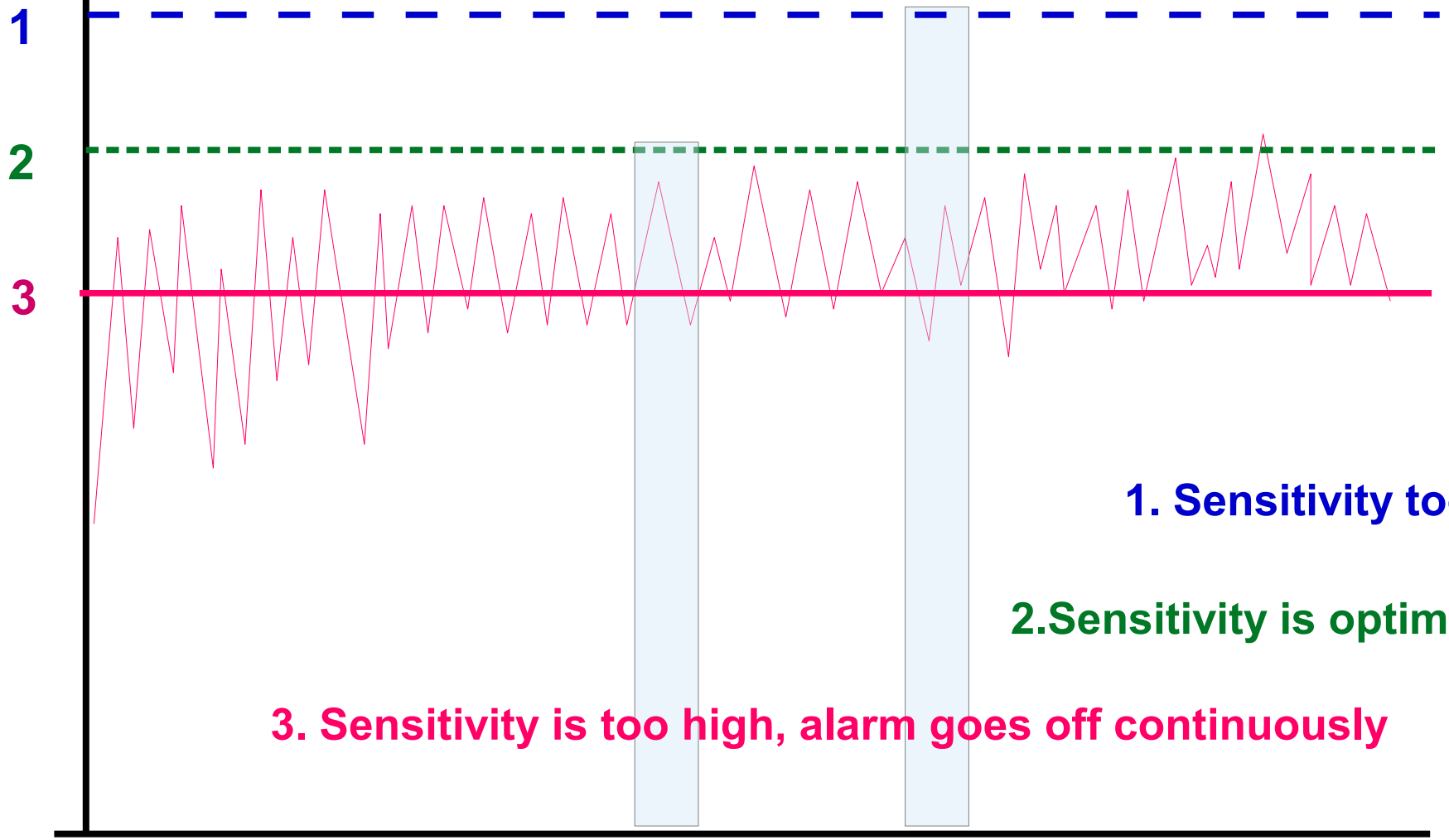


So, the weakest cell phone signal can be captured is limited by each frequency band's noise level.



The optimized sensitivity is band dependent.
It needs to be tuned individually.

Note: Noise levels are also location dependent.



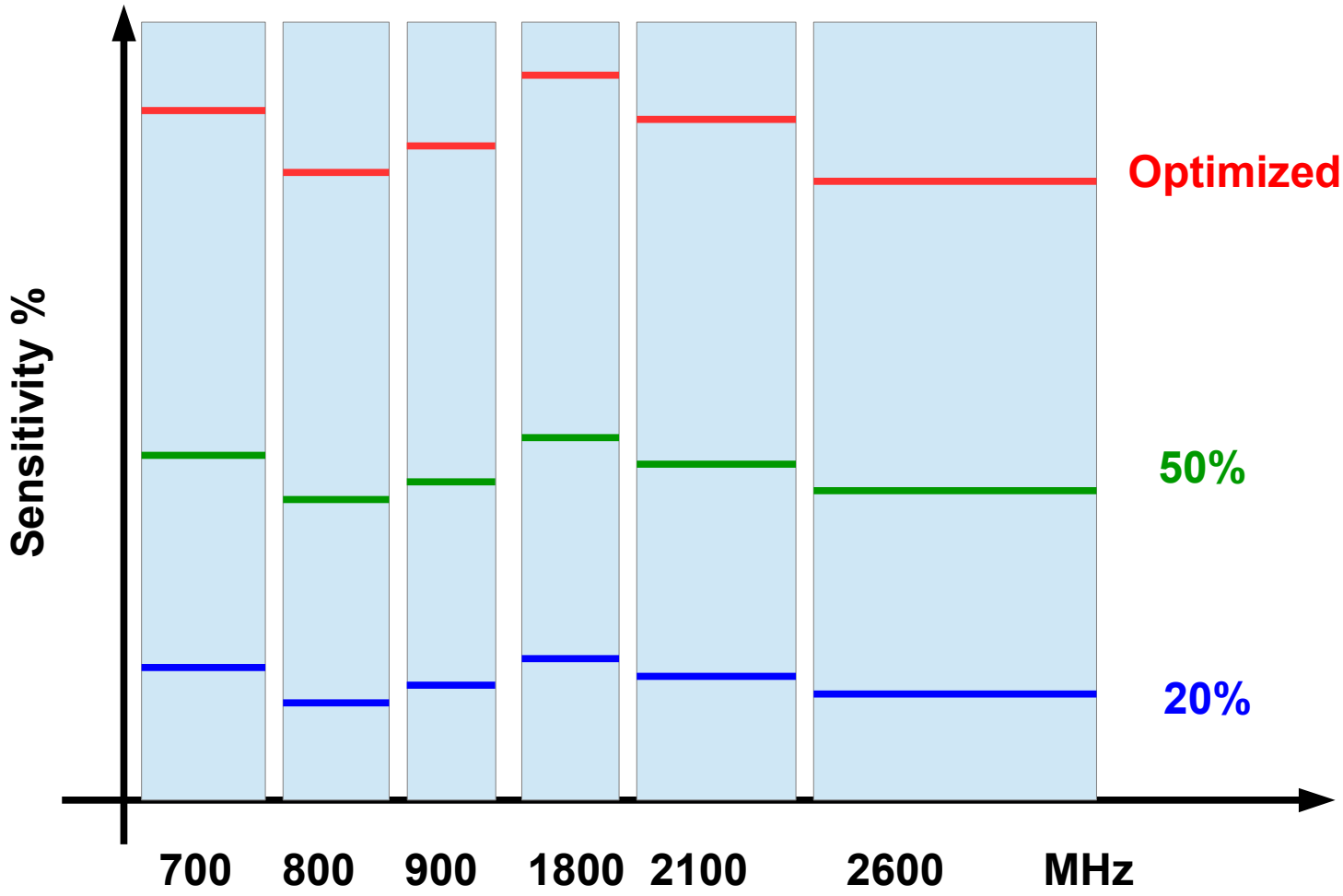
1. Sensitivity too low

2.Sensitivity is optimized

3. Sensitivity is too high, alarm goes off continuously

Over -All Sensitivity Adjustment

After sensitivity of each frequency band is optimized, we can use device control buttons or remote connection to adjust the over all sensitivity.



Summary:

1. User needs to have the basic understanding.

2. Detectable distance is location and frequency band dependent (Noise level).

3. It requires patience to optimize the system.

4. After tuning each band, over all sensitivity can be adjusted remotely.

5. Maximum detection distance has no absolute Value. It is affected by the cell phone user and the location of base station.

6. The farther from the base station, the longer is the detection distance.