Chapter 1 - The Body Antenna

Excerpt 7 from The Sage Age – Blending Science with Intuitive Wisdom

Impedance

Another factor in antenna efficiency is impedance, which includes all conditions that impede or reduce the flow of current through a circuit. Impedance in a DC, or steady state current circuit is measured by resistance alone. In an AC circuit where the voltage fluctuates both positive and negative, impedance includes resistance, capacitance and inductance, which we'll discuss in more detail in a moment. Your body is like an AC circuit. The voltage varies and spikes at times and there are multiple forms of resistance that fluctuate constantly. The basic concept of impedance is rather easy to imagine and is analogous to concepts of spirituality. It is also one of the core concepts in new medical imaging technology that will help move us into understanding the body as a united vibrational entity.

As stated previously, the radiation properties in the immediate vicinity of a broadcast antenna are known as the near-field pattern and differ significantly from the far-field pattern of the antenna. Near the antenna, part of the strong electric and magnetic fields generated by the antenna during broadcast are lost through ground absorption or are stored by the ground and then returned to the antenna in a delayed manner. Several factors, including impedance, play into creating the stored field and collectively they are called the antenna's reactance component. This storing effect drops off dramatically over distance and is not found in the far-field radiation pattern.

To summarize, the near-field area immediately surrounding an antenna is made up of several components which are:

- the strong electric and magnetic fields created when the antenna is powered,
- the broadcast signal itself,
- the reactance component, comprised of the antenna's physical impedance and the delayed return of the original broadcast signal which had been absorbed by the surrounding ground for a time.

In the near-field area, either the electric or magnetic field could dominate depending on the makeup of the antenna. Measurement of these fields must be taken separately, recording both their magnitude and phase in order to obtain a complete picture of how they are interacting. Together, these readings graphically describe what is known as the power density of the broadcast signal from the antenna in the near-field region. Add to this the original EM radiation plus the energy being stored and sent back toward the antenna as a reactive component and you can easily see that the near-field region around an antenna is a very complex phenomenon. In fact, the relationship

between the electric field and the magnetic field is so complicated that to obtain a true mathematical representation, it must be expressed in four dimensions. This same complex field has to be addressed by all medical imaging devices as well. The better we understand this near-field phenomena, the better we can make imaging devices for non-invasive diagnosis of the body's systems.

The part of the antenna's near-field reactance component we will focus on here deals with impedance and is composed of resistance, capacitance and inductance. Following are a few examples to familiarize you with these concepts.

Suppose you hook up a garden hose to a huge water tank. Water flows out of the tank as fast as the hose will allow. For the moment, consider this to be the best flow rate possible. Now, imagine that a section of the hose is cut out and a drinking straw is put in its place. The flow through the hose is dramatically reduced. No matter how big the rest of the hose is, the amount of water that can flow to the end of the hose is no greater than what can pass through the straw. This is an example of simple resistance. The straw restricts the flow to a diminished level but does not cut it off completely. It takes only one point of resistance to affect the entire flow. Even if more straws of the same size are spliced into the hose later down the line, no further reduction in flow will occur. The flow capacity has already been reduced by the first straw and the rest of the straws can handle that capacity. In other words, the flow is not further decreased by additional straws.

In people, one block of resistance has the same affect as the initial straw in the hose. It diminishes the capacity of flow of healthy energy through the rest of their system. Folks may have many straws in their life, but eventually the straw that is nearest to the tank will have to be found and restored to full hose size to re-establish full flow throughout the hose. For many, resistance to change is their number one straw.

Resistance reduces the flow, but does not cut it off. Capacitance is like having a kink in the hose which can cut off the flow. On one side of the kink, the tank is providing plenty of water pressure. On the other side of the kink, there is no water flow and no pressure. That end of the hose is in a neutral state. It's not active. There is no flow although plenty of water is available and ready to go. In fact, the water pressure is building up so much potential on the tank side of the kink that it may eventually rupture that side of the hose and force the water out in an unexpected, and often undesirable, places. The kink acts as a temporary insulator to the flow. Up to a certain limit, it has the *capacity* to hold back and store more energy than it lets flow through, which is why it is called a capacitor.

In people, the kink in the hose is like a boulder in their life path. The pressure buildup from a lack of healthy flow may erupt as a mental crisis or a physical disease. Often when a kink is released, there is a jolt in the hose as a result of the pressure being released. After this initial jolt the flow returns to a steady state. Many people experience this jolt during the unknotting of a kink in their life as a spiritual breakthrough episode. While the emotional high of it can be exhilarating, it's important to realize that the flow through the hose will soon return to normal. The goal is to

maintain this steady state of flow, not the pressure-jolting action created by kinks, nor the high that comes from releasing them. It's worth noting that stagnant energy builds up where there is no flow. After flow is re-established, it may take some time to flush out all of the accumulated debris. Eventually though, clear flow will return.

Resistance slows down the flow. Capacitance, up to a certain level, cuts off the flow. Inductance causes an interruption in the flow due to an outside interference. It *induces* a reaction in the hose by causing interference to the normal flow. Imagine an elephant standing near the hose and stomping on it every few minutes. Nothing is wrong with the tank, the water or the hose. The problem is created by an outside influence, which in this case is an elephant. This intermittent stomping action causes somewhat the same jerky reaction in the hose as a kink, but since the stoppage of flow is only momentary, pressure in the hose is not likely to build up to the point of causing a breakthrough leak. If the elephant is not stopped, the hose may eventually be damaged and an ensuing leak will occur from the influence of wear and tear.

Most everyone has something that grates on their nerves. Constant, long-term exposure to such outside influences may eventually result in ill-health. A sudden disruption of flow can also result in an emotional outburst, especially when flow is restored. This is not the same sort of dramatic high that a spiritual breakthrough provides, but the body does have chemical reactions to such episodes. Some people get addicted to these chemicals and purposefully place their hose near a stomping elephant time and time again. Such behavior is the result of being an emotional junkie. Even if a situation seems detrimental, it allows the person to get their "fix" on a consistent basis. However, in the long run, the dedication to that choice will eventually lead to a break in the hose.

Conversely, if a person determines that the stomping is merely an annoyance, they may choose to find a way to change themselves so that the interference is less bothersome. Some ancient teachings imply that all such annoyances are a matter of choice in perception. It is a common story for a widow to have once lamented that her husband's snoring kept her awake but that after he passed, it was one of the things she most missed about him. So, the snoring was both a source of annoyance and comfort depending on the perspective.

So, impedance is any combination of:

- resistance, which slows down the flow,
- capacitance, which, up to a point, cuts off the flow,
- and inductance, which temporarily reduces the available flow due to external interference.

There is one other interesting aspect of impedance we want to explore here. Unlike resistance alone, impedance varies with frequency. This is due to the fluctuating nature of the inductor and capacitor components. This effect is called reactance. These elements are passive until there is a change in voltage, which happens when the antenna broadcasts. In other words, there is

no resistance to flow by either capacitance or inductance until the antenna attempts to send out a broadcast signal.

Reactive elements absorb power and then later return it to the source, unlike purely resistive elements which actually lose power by dissipating it as heat. The reactance produced by inductance is proportional to the frequency of the alternating current, whereas the reactance produced by capacitance is inversely proportional to the frequency. In other words, inductance and capacitance oppose one another. Reactance is a complicated subject, so we we'll only go into a few of the technical aspects here. Our focus is to demonstrate the most basic aspect of impedance as it relates to the body antenna through variations in frequency.

Reactance in an antenna system is comprised of two parts, one that is real and one that is imaginary. For clarity, the technical term imaginary here does not mean that it is not real. It only means that it cannot be measured directly. The real part is the resistive component. The imaginary part is the combined capacitive and inductive components. Antennas work best when their reactance is purely resistive. In other words, antennas work best when their power is dissipated only through a loss of heat. Recall the analogy of how electricity flows from one end of a battery to the other end through a wire. While most of the energy is returned to the battery, some of it is lost, or dissipated, through the friction caused by the moving electrons. This friction causes heat in the wire. Thus, some of the battery's energy is lost as heat. When an antenna losses power through this same type of resistance alone, it allows the antenna to attain a resonant state.

Most everyone has some sort of petty friction in their everyday lives. While each instance is not exhausting, such resistance to flow causes a small loss of power in the body's system. If this type of small power loss is all that drains the system, it is fairly easy to maintain a resonant state. These small power losses can also easily be restored through rest, meditation and proper diet.

When an antenna losses power due to either capacitance or inductance, the antenna does not work as well and often cannot maintain a resonant state. Because capacitance and inductance are opposite one another, the capacitive component of an antenna can be nullified by installing a reciprocal inductive component into the system. In other words, they cancel each other out when properly matched. This creates a balanced state in the antenna system. Think of it as the yin/yang of an antenna. For the antenna to work properly, these opposing elements must be kept in dynamic balance.

Mothers who work outside the home offer a good analogy of this type of balance. When one or the other of these activities becomes dominant, the entire system loses power. The only way to remain truly effective is to keep each in dynamic balance.

When the antenna element itself is longer than the wavelength it is transceiving, it is considered to be inductive. When the antenna element is shorter than the wavelength, it is considered to be capacitive. Changing the length of the antenna is a simple way to bring the capacitive and inductive components into balance. Ritual postures change the length of the body antenna.

Why is this important? Because the actual power that the antenna can broadcast is a direct function of its resistive component, which is the part that makes the antenna resonant. Any reactive components in the antenna system reduce power output. All the power in the universe can be fed to the antenna, but if it is not resonant (with no reactance), very little power will actually radiate from it.

Have you ever met someone who is so charismatic that their enthusiasm for life is contagious? It is likely that they have found a way to come into harmony with the vibration that quickens their spirit and their whole being acts like a focused conductor or resonate antenna for that vibration. Have you ever met someone who seems scattered or constantly distracted? It's likely they have an overabundance of unbalanced reactive components in their life.

The energy that is absorbed by the reactance components and later returned to the antenna also creates a standing wave. This is considered to be reflected power and because it is out of phase with the initial broadcast, it is usually a destructive pattern of interference. If the antenna is working well, most of the broadcast power is radiated outward toward the far-field with very little of the power being reflected back toward the antenna. The difference between the outwardly radiated power and the reflected power is the actual or true power radiated by the antenna. In broadcast terms, this is known as the standing-wave ratio (SWR).

So what happens to the rest of the energy that was driven to the antenna but can't radiate out because of reactance? It's trapped by the capacitive/inductive field. Perhaps a good analogy would be the power source for a spaceship. Only some of the power is available for thrust. A percentage of all of the available power must be kept in reserve for such things as life support. This type of reserve is not available for thrust. Likewise, some percentage of the power output of a broadcast antenna is always held in reserve and is not available to send the signal on its way.

The reactive near-field area around an antenna can be dangerous if the transmission signal is very powerful. Some of the energy being transmitted from the antenna is stored in electric and magnetic fields. Instead of the energy radiating outward, an energy exchange develops between the source and the fields. Since human tissue absorbs both electric and magnetic field energy, entering the reactive area around a broadcast antenna is potentially hazardous to health. As you move away from the antenna, the energy in the near-field becomes radiative (it radiates outward, not back toward the antenna) and contains no reactive components; therefore, it is a little less dangerous. Any conductive material brought into the near-field region can become an antenna that absorbs the near-field energy and re-radiate it, causing its own near-field region. This is why it is dangerous to live in the immediate vicinity of a powerful broadcast antenna or high power line.

All antenna systems contain a reactive component. While it cannot be completely eliminated, the effects of it can be diminished so that the antenna operates at its highest possible efficiency. For the human antenna, this means relieving the kinks that cause capacitance, and reducing the effects of harmful outside influences felt through inductance. Maintaining a dynamic balance between these two is the primary principle found in all of Eastern philosophy.

No antenna is a perfect conductor. All antennas have some form of inherent resistance due to the nature of their composition. An antenna's construction determines its basic impedance, which is the combined effect of its resistance, capacitance and inductance. A dipole antenna usually has high voltage and small current. Thus, it has a strong electric field surrounding it. (Recall that a buildup of charges is created when there is voltage but little to no flow of current.) This uneven distribution of charges results in an antenna with high field impedance. In a loop-type antenna there is typically a high-current area. This generates a strong magnetic field and results in low field impedance. Changing the body's posture also changes the impedance of the field surrounding certain parts of it.

An impedance mismatch between an antenna and its transmission line leads to a loss of signal and power. For the antenna to operate at peak efficiency, its impedance must be matched to its source, which is the transmission line. Why is impedance matching important? When your body (the antenna) is matched to the source (the transmission line) you can transmit and receive with maximum effectiveness. There is little signal loss. Take note that when there is an impedance mismatch, the antenna is altered to match. The source does not change. An impedance mismatch becomes increasingly problematic with higher frequencies. In other words, an antenna has a much more difficult time receiving higher frequencies when it is not matched well to the source. Intuitives describe the signals from the other realms as light of a higher frequency than what we normally experience in the physical realm. Bringing the self into alignment with the source makes the antenna system more efficient and powerful, especially in this higher range.

Impedance measurement—especially that which is caused by reactance—is a growing field in the medical imaging industry. All substances have a different electrical impedance value dependent on its molecular composition. When human tissue is exposed to a frequency as is found in even a small electrical voltage, it absorbs and then releases that energy. A hand-held imaging device can act as both a transmitter and receiver of this energy. A cancerous tumor, because of its capacitive and inductive elements, will absorb and release energy differently than the healthy tissue that surrounds it. The imaging device can measure this difference in impedance and help locate the unhealthy tissue leading to earlier detection by non-invasive means.

If you've ever seen Star Trek you've likely noticed the characters frequently using a scanning device called a tricorder. It allows them to aim the device toward an object and determine the physical composition through analysis of the energy field surrounding and permeating it. They also have a medical tricorder that can specifically detect the status of an organism. The technology of today's imaging devices is not as far removed from the tricorder as you might think. A better understanding of vibrational energies will lead to the development of such a device.

Now, let's review a few basic aspects of antennas mentioned previously and collect all this information into something meaningful. The length of an antenna is one characteristic that determines the frequency at which it is resonant, or transceives most efficiently. As stated previously, frequency is determined by the length of its wave, called the wavelength. So, the

dimensions of the antenna are directly proportional to the wavelength it can best use. The shorter the antenna, the shorter the wavelength it can best transceive. The shorter the wavelength, the higher the frequency and the higher the energy it can carry. The near-field area around an antenna is considered to be the distance that is less than one wavelength from the antenna. The shorter the antenna, the shorter the area of its near-field region. The size of the human antenna ranges from the full body length all the way down to cells and micro-organisms in the body. The larger body antennas primarily transceive larger wavelengths of lower energy. The smaller biological antennas primarily transceive shorter wavelengths which have higher energy values.

Here's something interesting to consider about the body antenna. A fetus, with its small structure and curled up as it is in the womb is transceiving very short waves, meaning the highest in both frequency and energy. It is also near the center of the mother's body antenna system.