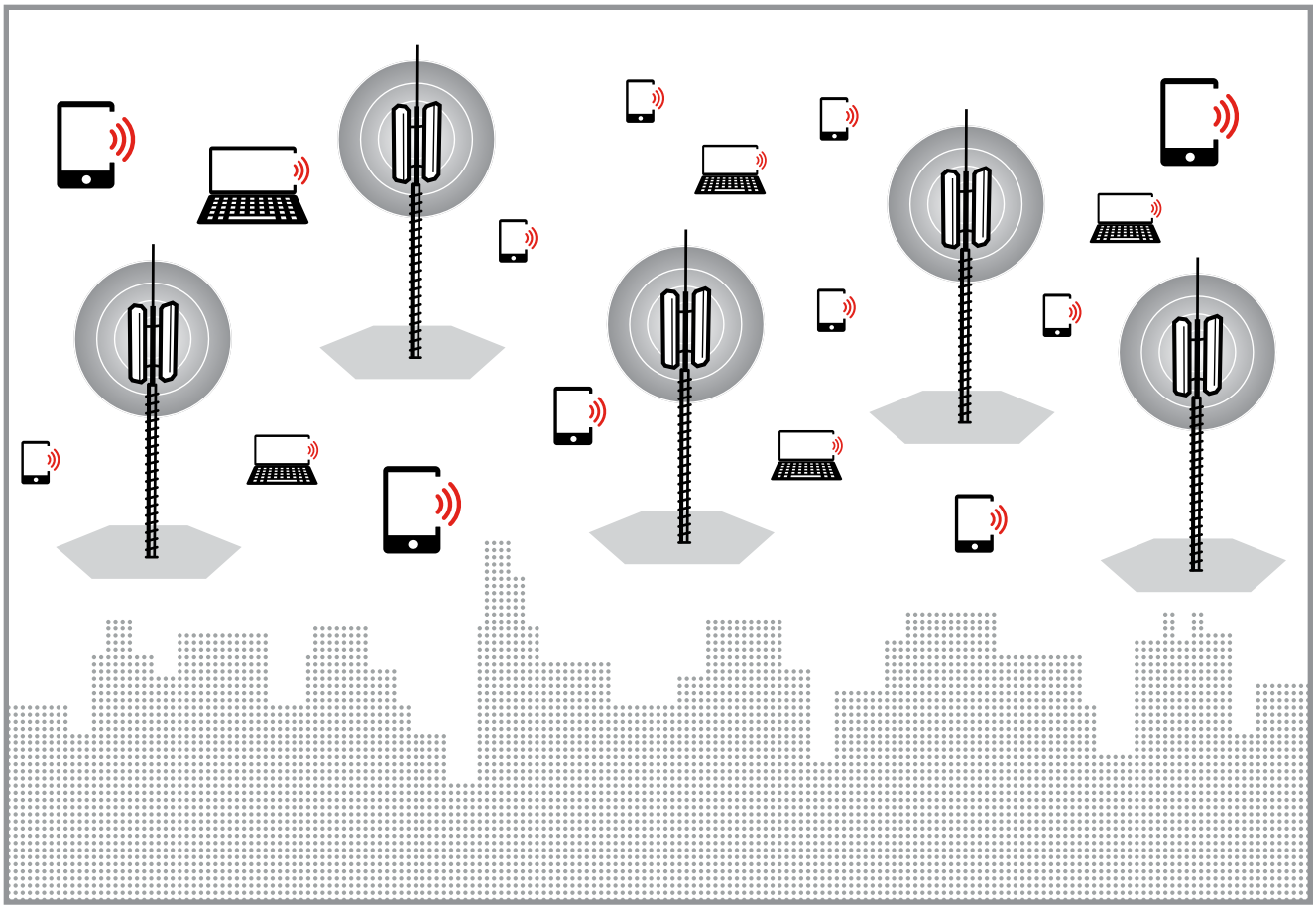
KATHREIN

The Role of Antenna Quality in Meeting Mobile Data Demand



Abstract

Fueled by the ever-increasing popularity of smartphones and tablets, along with the emergence of IoT (Internet of Things), wireless communication has experienced explosive growth over the past decade. Still, some experts predict to see an exponential, **1000-fold increase** in mobile data traffic between 2010 and 2020.

The wireless industry as a whole has taken on the challenge of cost-effectively supporting this increase, with service providers struggling to deliver enough bandwidth to meet consumer demand. This white paper will explore the factors driving this trend, the challenges faced by wireless carriers in keeping up with demand, and highlight the importance of antenna quality in developing a long-term solution for addressing these challenges.

The Data Explosion

For network operators, the key factors in advancing wireless networks are the ability to meet demand for more bandwidth, user capacities, the consumers' quality of service (QoS) and the ever-present need to reduce operating costs. As the industry advances from 3G to 4G LTE and looks beyond to 5G, demand for bandwidth capacity continues to increase at lightning speed. **ABI Research predicts** an increase in global mobile data upload traffic from 6,860 petabytes to more than 60,000 petabytes by 2019.

Top data consuming activities include music streaming, social networking, cloud sync/apps, web browsing and content downloading, with video streaming being the largest contributor to mobile data download traffic, which ABI Research expects will increase from 50% to more than 70% in 2019.

Causes of Increasing Consumer Data Demands

FASTER INTERNET SPEEDS

With the introduction of the World Wide Web in the early 1990s, dial-up internet access was limited to 56 kbps modems connecting via phone lines. Today, consumers can achieve mobile internet speeds of up to **20 mbps** in the palms of their hands, and demand will only increase from here.

HIGH-BANDWIDTH APPS

In 2009, worldwide mobile app downloads amounted to approximately 2.52 billion and are expected to reach 268.69 billion in 2017, according to **Statista**.

LARGER SCREENS

While larger screens come with the promise of a richer content experience, the reality is – big phones require big data. **Research** from the Connected Intelligence SmartMeter shows consumers with smartphones that have 4.7-inch and larger screens use about 4GB of data a month, twice that of consumers who own smartphones with smaller screens.

THE INTERNET OF THINGS

Experts are predicting anywhere from 25-50 billion connected "things" will be in use by 2020. The projected explosion of IoT and wearables will only exacerbate the data traffic problem, forcing operators to rethink their mobile network architecture.

Challenges Faced by Mobile Carriers

RISING INFRASTRUCTURE COSTS

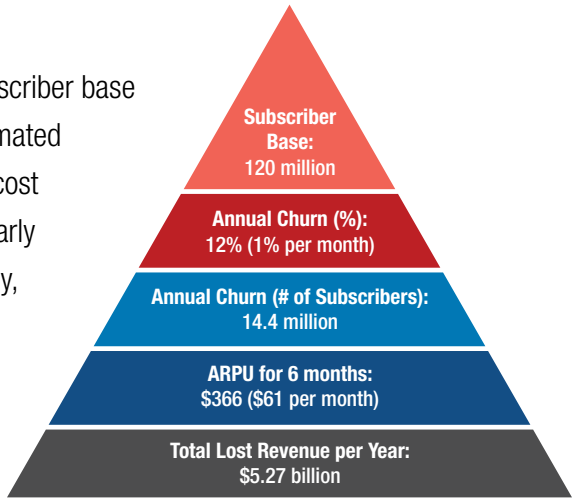
The rapid growth in data traffic forces carriers to expand their networks. One of the biggest challenges faced by operators is how to design data traffic within buildings to meet future demands. A **CTIA survey** found wireless carriers invested more than $32 billion into the U.S. economy in 2014 capital expenditures. The **Wireless Infrastructure Association** projects investments between $34 billion to $36 billion per year over the next several years.

UNRELIABLE WIRELESS SERVICE

The sheer amount of traffic wireless networks are subjected to, along with the growing number of heavily congested metropolitan areas, has a negative impact on quality of cellular network service. Spotty connections, dropped calls and interference can easily lead to an increase in churn rate.

CUSTOMER CHURN

When considering lost revenue alone, a single operator with a subscriber base of 120 million customers and an annual churn rate of 12% is estimated to lose $5.27 billion per year. This does not take into account the cost of acquiring a new customer to replace those lost, which could nearly double the lost revenue each year for a wireless carrier. Additionally, defecting customers can further damage the brand's value through word of mouth, by telling friends, family, and social media followers about their bad experiences, resulting in an immeasurable loss of potential future earnings.



The Cost of Subscriber Churn

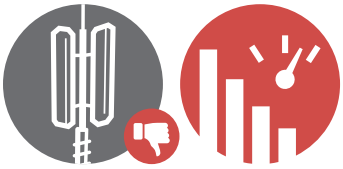
The Importance of Antenna Quality

SUPERIOR ANTENNA QUALITY REDUCES CARRIER COSTS

The typical cost of antennas is less than 5% of the total cost of a tower site, yet they have a huge impact on the overall performance of the network. With the growing customer demand for data and the increasing cost of upgrading the wireless infrastructure, it's natural for carriers to aim to cut costs wherever they can. However, service providers must be cautious in deciding what to skimp on to ensure revenue won't be lost in the long run.

When it comes to antenna quality, carriers should focus on the big picture. An upfront investment in antennas of the highest quality can mean a lower TCO (Total Cost of Ownership) over the life of the product as well as higher customer services rates, lower churn rates, and a stronger reputation for call quality, resulting in higher total revenue.

On the other hand, any initial savings made by purchasing lower quality antennas is negated if a site needs to be revisited to swap out any failed antennas.



SUBPAR ANTENNA QUALITY WEAKENS NETWORK PERFORMANCE

Mobile operators have spent billions of dollars both building and making improvements to their ever-expanding wireless networks. While each component plays a significant role in the efficiency of the network, the performance of the antennas deployed within the network can serve as a key limiting factor of network capacity. Poorly designed antennas can cause major interference, limiting traffic capacity and maximum throughput.

Purchasing low quality antennas with high failure rates can cost operators big:

Network with 40,000 Antennas
Failure rate: 2%
800 antennas to exchange/year
Cost: ~$1,200-$3000/site
800 site visits = $960,000/year

At Kathrein, Quality Leads the Way

With more than 94 years of experience in antenna production, **Kathrein is the world leader in LTE antenna innovation** and implementation, and is the only manufacturer with the capability of producing up to 100,000 antenna systems per month, making it the world's oldest and largest antenna manufacturer. Kathrein is the gold standard in antenna production. And the company never strays from those standards.

6 Things to Look for From an Antenna Manufacturer

1. An outstanding reputation
2. High quality/low failure rate
3. Low total cost of ownership
4. High throughput
5. Low interference
6. Excellent post-sale service

The amount of variation of the main pattern, tilt, accuracy of the tilt values, cross-polar ratio, front-to-back ratio, and changes in horizontal or vertical beamwidths are all critical factors that Kathrein takes into account in order to produce the highest quality antennas. The exceptional quality of Kathrein's products drive down CAPEX and OPEX, accelerating return on investment. Additionally, the company's history, knowledge, and service after the sale help to keep it number one.

Kathrein employs unique, proprietary testing of its products and systems, resulting in high product reliability and failure rates well below the industry average.

Kathrein Failure Rates

ANTENNAS	FILTER PRODUCTS	RCUs
Below 0.05%	Below 0.08%	Below 0.007%

These images show the inside of a Kathrein antenna that stood near the coast of Norway. Despite being subjected to humidity and salty air for five years, there were no negative effects on its function or appearance.

Total Cost of Ownership

Over the decades, the name Kathrein has become synonymous with quality. As a result of this company principle, its products and solutions are of a particularly high quality which is marked by their durability, maturity, sophisticated design, robustness and sustainability. Moreover, Kathrein antennas are essentially maintenance free, with no additional yearly OPEX, due to:

- Nearly a century of mechanical design experience
- More than 150 mechanical tests completed during the development phase
- Superior materials selected for critical parts
- Long-term environmental test scenarios
- Future-proof solutions

Kathrein invests a considerable amount of research and development time on the front end to ensure mobile operators can invest securely in the building and expansion of their networks. The superior design and construction of Kathrein antennas make them durable – suited for all climatic conditions, high performing, flexible and efficient.

Looking ahead, Kathrein is currently engaged in significant research and development activities around 5G implementation, spending time with the top engineers at carriers' headquarters to truly understand future requirements. Additionally, Kathrein is leading the advance toward MIMO (Multiple Input, Multiple Output), which will be the key to achieving the desired increase in data rates. Kathrein is uniquely poised to help mobile operators achieve this and much more.

Kathrein Antennas in Action

San Diego, CA – [April 2015] – One of the big four U.S. wireless operators decided to deploy antennas from a "cost effective" telecommunications equipment maker, over Kathrein. However, they would soon realize that cheaper isn't always better. Upon making the switch from Kathrein's dual-band antennas to the other manufacturer's Hex Port antennas, the carrier experienced some alarming issues with PIM (passive intermodulation), as well as both accessibility and retainability (blocked and dropped calls).

After quickly making the decision to switch back to a higher quality unit made by Kathrein, BTS (Base Transceiver Station) statistics drastically improved. The downlink throughput improved by nearly 40%, from an average of 5 mbps to an average of 7 mbps. The service provider also saw an improvement in customer satisfaction, with far fewer dropped and blocked calls.

Summary

Key factors in expanding wireless networks include the ability to meet demand for more data at faster speeds with the highest quality of service, while significantly reducing site visits and operating costs. Investing in superior quality antennas enables operators to increase the bottom line by reducing TCO and decreasing customer churn. Operators can then invest those cost savings directly into expanding the wireless network in order to meet the skyrocketing data demands of its customers.

About Kathrein

Kathrein is the innovation and technology leader in today's connected world. Kathrein's wireless base station antennas, small cells, and antenna line device solutions enable people to communicate globally. Nearly a quarter of all LTE antennas sold and deployed worldwide come from Kathrein. Ranked number one among providers of mobile communication antennas by **ABI Research**, Kathrein is a hidden champion and family-owned enterprise that has been working on the technologies of tomorrow since 1919. For more information about Kathrein products, visit **http://www.kathreinusa.com**.

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