



ASH

■ CREATIVE WIRELESS ELECTRONICS ■

**How trends in wireless  
communication will shape  
the future of your business**

■ [WWW.ASHWIRELESS.COM](http://WWW.ASHWIRELESS.COM) ■

# Introduction

---

Wirelessly-enabled devices are being developed at a fast pace due to high demand from consumers and businesses alike. To help you understand how innovations in wireless technology can help your business gain a market advantage, this guide explains the progress that has already been made, takes you through current trends and tips for making the most of them, and shares our predictions for the all-important future direction of the technology.

## Overview

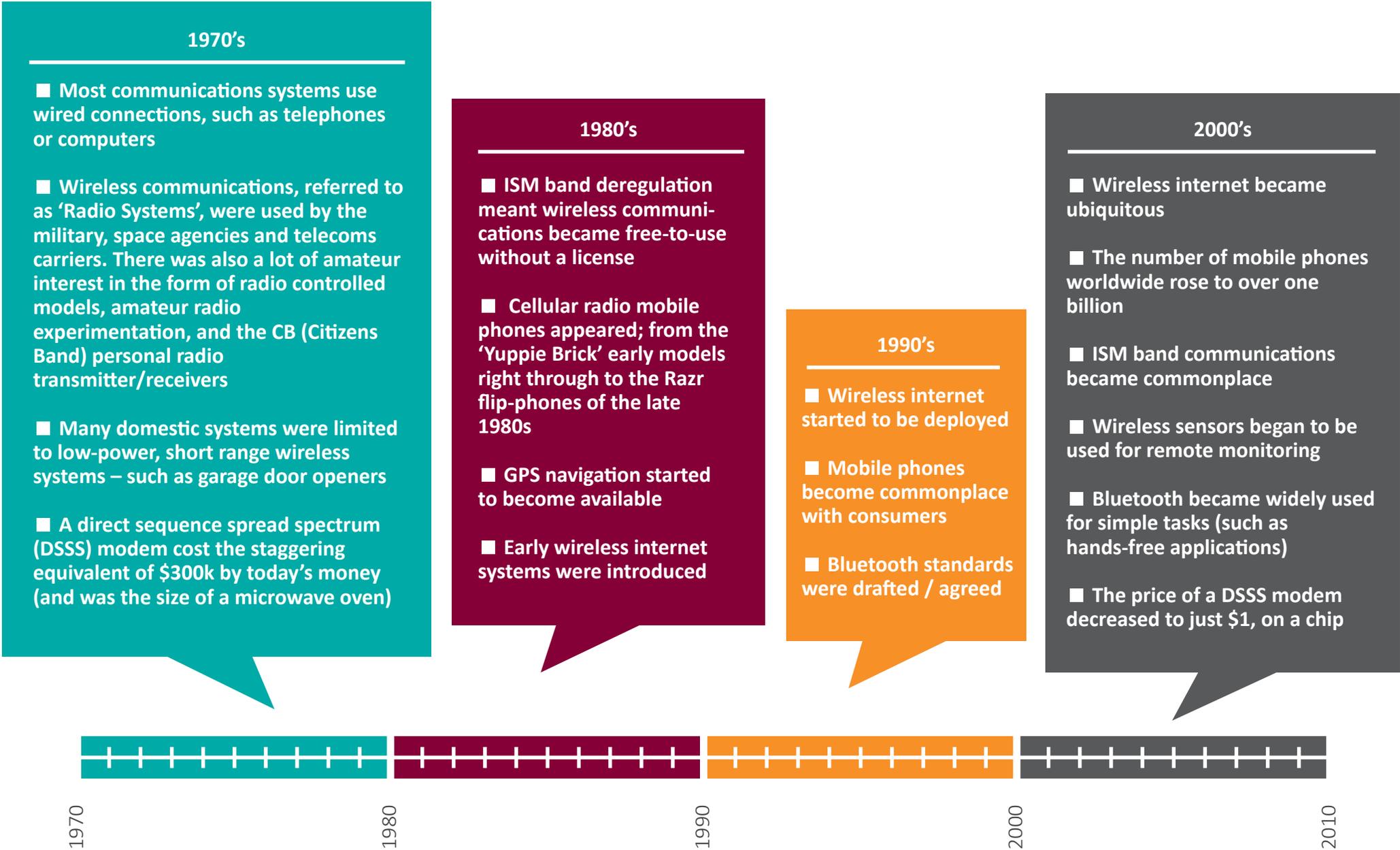
**Where have we come from?**

**What's trending in wireless technology?**

**Where is wireless technology heading?**

# Where have we come from?

Every decade since the 1970s has seen significant evolution in wireless communications. Here are some key milestones:



# What's trending in wireless technology?

While wireless communication innovation is seeing tremendous progression, the physical range of transmissions has remained fairly static. This is a useful reminder that wireless communication advances are usually dictated by what the market wants, rather than what is technologically possible.

This section identifies both upward and static trends that have the possibility to shape the future of your business, along with tips for making the most of them.

## Upward Trends

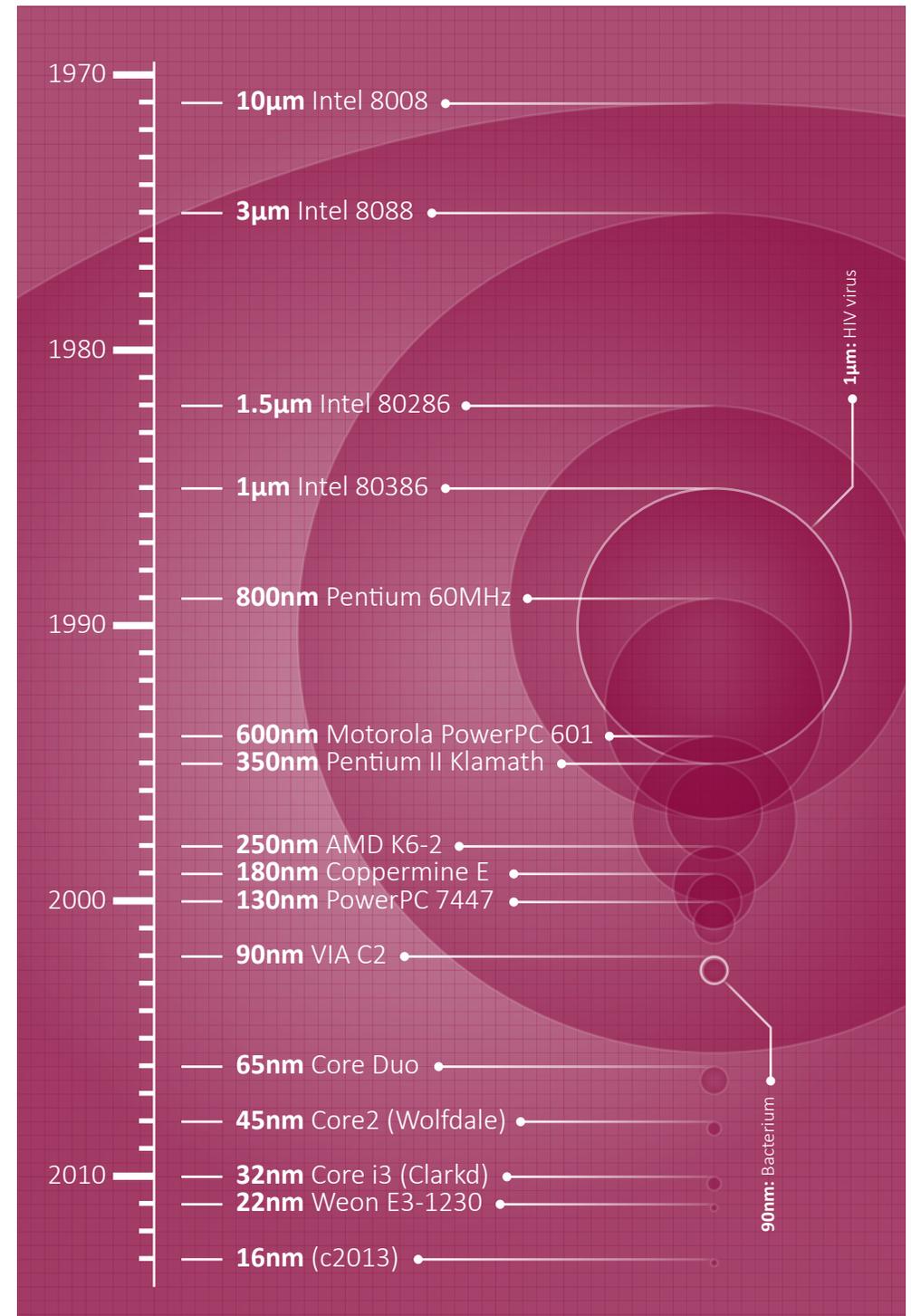
### Miniaturisation.

This a key driving force making wireless technology more usable, practical and feature rich. By the rate of miniaturisation over the last 45 years, a component on a chip measuring 10µm (micrometres) in 1970 then would be just 10 nm (nanometres) now. The diagram on the right shows just what this means in real terms.

One of the consequences for electronic product design is that complex systems are now available on a single chip, allowing for more creative applications. Components of the same physical size now offer increased performance and a wider range of features. Due to this increased complexity, expert support is often required when developing new products.

**QUICK TIP**

See our resource [‘How to unlock the secret of wireless range’](#) for more advice when putting together your specification.



## Interconnectivity.

The integration of as many systems as possible is a pervasive trend across most technology fronts today. With the ubiquitous use of the web, cloud-based systems and connected devices (also known as the 'Internet of Things') increasingly popular, it's a trend that will continue for the foreseeable future.

## Affordability.

As evidenced by the decrease in the cost of a DSSS modem over the past 40 years, technology gets significantly cheaper over time. It's clear that further reductions in component, system and manufacturing costs will drive forward the implementation of new technologies.

### QUICK TIP

**Consider how the falling cost of key components could open up new possibilities in the near future and design solutions that take full advantage of these opportunities.**

## Device convergence.

Smartphones are a perfect example of how many different functions can be brought together in one system. Users are more keen than ever to control different technologies from a single point that is convenient to them and easy to use. As such, you need to ensure that your wireless device or system communicates well with the popular native wireless standards employed in the growing mobile market.

More than that, wireless devices increasingly need to use a number of types of wireless communication within the same design e.g. WiFi as well as Bluetooth. This prolongs the useable life of the device as it can communicate with a variety of network types and settings, widening its market appeal..

### QUICK TIP

**Do your homework when selecting a wireless device, especially when choosing ones that include a number of communication standards. Ensure your needs are well matched by the features the standards offer.**

## Device performance.

Sending large amounts of data over a short range is becoming increasingly possible and, more importantly, economic as well. The wireless market is already seeing the emergence of high speed 60 GHz radio frequency devices capable of 1Gb/s data rates, which are ideal for short range large data requirements.

Whilst systems using such frequencies were previously an expensive and not very widespread option, the device costs continue to drop. This has enabled wireless networks and devices to increase performance thresholds further.

### QUICK TIP

**Be clear about what data you need to communicate, how far and how frequently. This is the basis for deciding which technology provides the best solution. Have a big vision of how you want the technology to do and ask a wireless expert what solution will best meet your budget.**

## Battery density.

Battery density has increased threefold in the past 40 years and is showing continued steady improvement. This is fueled by battery technology advances in areas such as handheld devices and electric vehicles. While these advances are significant and should not be understated, it's important to recognise that the rate of development is plateauing more than the advances in other areas such as miniaturisation.

### QUICK TIP

**Choose a battery with the greatest capacity within the physical size constraints of your design and then ensure your system uses the techniques contained in our resource '5 ways to maximise your battery life'.**

# Static Trends

## Radio range.

Radio range has not markedly increased during the evolution of wireless networks as enlarging transmission range requires more power and is expensive to implement. Another factor prohibiting development is the legislation on transmitter strength in combination with the decreasing cost and increased availability of excellent localised transmitters. Consumers are now used to accessing widely available local access points and do not expect long range communication from their devices. Some techniques are used for long range wireless devices in smart monitoring systems, but, as our resource 'How to unlock the secret of wireless range' shows, they require a very low data rate.

### QUICK TIP

**Increasing radio range comes with compromises in other areas of the system design. The best route is to work within the performance constraints of common communication methods.**

## The battery life of handheld devices.

Consumer expectations of modern handheld devices are higher than ever, and considerable effort has been made to improve the performance of batteries to meet these high demands.

These improvements in battery performance have sustained acceptable battery life while increasing the amount that a device can do. The most likely trend is therefore that that battery life will remain static while improvements to efficiency are made to keep up with increased demand for higher performance.

### QUICK TIP

**Use techniques such as low duty-cycle, micro-scheduling and low sleep currents in your design. Additionally, low-power support circuits and the right battery choice will optimise the battery life.**

# Where is wireless technology heading?

---

One trend appears certain – expect to see increased complexity in wireless systems. While this presents a challenge as the room to expand features becomes increasingly limited the more complex systems become, developments in technology are meeting this challenge head-on. Recent innovations in silicon chip design and manufacture have allowed transistors to be stacked on their side, increasing the quantity that can be fitted into a given space on a sheet of silicon.

## Here are the trends you can count on

### Increased performance in wearable devices and processing power.

Battery powered, wearable wireless devices will increase in capability and performance. This will influence the design and use of the technology in all applications. The wearable device market is predicted to jump from \$14 billion in 2014 to over \$70 billion in 2024 (source: IDTechEx).

### Lower radio component costs.

The growing trend of embedding radio components in systems on a chip (SoC) offers new opportunities to use a wireless connection in designs that previously didn't have the feature. Complex systems will be more cost-effective and easier to integrate into designs.

### Greater sensor variety and use in wireless systems.

New ways to collect data and automate systems will be available as it becomes more cost effective to implement wireless systems. The ability to deploy such sensing systems more easily will result in increased targeting of niche monitoring environments. Sensing systems simultaneously measuring multiple sources of diverse data will be common.

### Even smaller device sizes.

Further functionality will be introduced into smaller-sized applications. For example, wireless devices and systems will increasingly be used in medical treatment and intervention. Devices capable of using a number of different types of wireless connection will be common.

### Lower shut-down currents.

Power scheduling will be used more efficiently resulting in lower shut-down currents and increased service times for wireless systems. Battery powered devices will run for longer before needing replacement or recharge, making 'once-fit' systems an increasing reality for certain applications. For some of these, battery maintenance will no longer be required over the system life.

### Higher bit rates.

Wireless systems utilising higher bit rates will increasingly become available. These faster wireless connections allow more data to be transmitted over a given time but come at the expense of radio range.

### Increased device interconnection.

Devices are increasingly being designed to collaborate and connect with other wireless systems and the internet. Interconnected devices increase the potential to integrate various systems and control them from one place. Tens of billions of internet enabled smart devices with IP addresses are estimated by 2025 (source: IDTechEx).

## Keep in mind:

- **Significant improvements in transmit power, sensitivity, bit-rate and range are not expected.** Wireless communication systems are already near the regulatory and fundamental limits in each of these areas.
- **Significant improvements in battery capacity are not expected.** Battery life will remain static while improvements to efficiency are made to keep up with increased demand for higher performance.

## How can your business make these trends count?

Wireless communications is a fast moving sector, both in terms of technology and user adoption and expectations. The growth of the last few decades has accelerated with the mainstream arrival of wireless internet usage and the so called Internet of Things

A number of key trends, such as miniaturisation, interconnectivity, affordability, device convergence and increasing performance should be leveraged to help shape the future of your business whilst working within the constraints of radio range and battery life. The certainty is that wireless communications systems will need to become even more complex to evolve and grow - ensure that your organisation gets the right advice and expertise to make sure you're ahead of the game.



# ASH

■ CREATIVE WIRELESS ELECTRONICS ■

Wherever you are in the product development cycle,  
or if you have any further questions as to how wireless  
communications can help your business, call ASH...

**+44 (0)2380 551 044**

■ [WWW.ASHWIRELESS.COM](http://WWW.ASHWIRELESS.COM) ■