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Narrowband Internet of Things Technology



What is [narrowband internet of things technology](#)? Why is the [narrowband](#) internet of things technology emerging?

What is narrowband internet of things technology?

[NB-IoT](#) refers to NarrowBand Internet of Things ([Narrowband-IoT](#)) technology. Different [IoT](#) services have different requirements for data transmission capability and real-time performance. Depending on the transmission rate, IoT services can be differentiated into high, medium, and low speed:

High-speed IoT services:

Mainly using [3G](#) and [4G](#) technologies, such as in-vehicle IoT devices and surveillance cameras, the corresponding business features require real-time data transmission;

Medium speed IoT services:

This is a service that uses GPRS technology, such as lockers in residential areas or supermarkets, which is used frequently but not in real-time, and requires much less network speed than high-speed services;

Low-rate IoT services:

The industry classifies the low-rate service market as the LPWAN (Low Power Wide Area Network) market, i.e. low-power wide area network. At present, there is no corresponding cellular technology, most of the cases through the GPRS technology barely support, which brings high cost, affecting the low penetration of low-rate services.

In other words, there is an urgent need to develop the low-rate service market, which is actually the largest market, such as fire extinguishers in buildings and various monitors used in scientific research, which appear very infrequently in life, but the total amount of data collected is considerable.

NarrowBand Internet of Things is a new narrowband cellular LPWAN (Low Power Wide Area

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Network) technology that can help us solve this problem.

What are the advantages of narrowband internet of things?

As technology for low-rate services, the advantages of narrowband internet of things are easy to imagine:

The narrowband internet of things has strong links

With the same base station, NB-IoT can provide 50-100 times more access than existing wireless technologies. It can support 100,000 connections per sector, low latency sensitivity, ultra-low device costs, low device power consumption, and optimized network architecture.

For example, due to bandwidth constraints, operators only open up 8-16 access points per router in the home, and there are often multiple mobile phones, laptops, and tablets in a home. With many mobile phones, laptops, and tablets in a home, it will be a big challenge to achieve house-wide intelligence and to network hundreds of sensing devices in the future.

Narrowband internet of things is sufficient to easily meet the demand for networking a large number of devices in the future smart home.

The narrowband internet of things has high coverage

NB-IoT has strong indoor coverage, with 20dB gain over LTE, which is equivalent to a 100 times increase in coverage area capacity. Not only can it meet the demand for wide coverage in rural areas, but it is also suitable for applications such as factories, underground garages, and manhole covers, which require deep coverage.

Take manhole cover monitoring as an example, in the past, GPRS needed to extend an antenna, which was easily damaged by vehicles coming and going, while NB-IoT can solve this problem as long as it is deployed properly.

The narrowband internet of things has low power consumption

Low power consumption is an important indicator for IoT applications, especially for devices and occasions where batteries cannot be replaced frequently, such as all kinds of sensing and monitoring devices placed in remote areas in high mountains and wilderness, which cannot be charged every day like smartphones.

NB-IoT focuses on small data volume and small rate applications, so the power consumption of NB-IoT devices can be very low, and the device life can be significantly increased from a few months to several years.

The narrowband internet of things has a low cost

Compared to LoRa, NB-IoT does not require a new network, and RF and antennas are basically reused. China Mobile, for example, has a relatively wide band is 900MHz, and only needs to clear out part of the 2G band to deploy LTE and NB-IoT at the same time.

Low speed, low power consumption. Low bandwidth also brings low-cost advantages to NB-IoT chips and modules. Modules are expected to cost less than US\$5.

However, narrowband internet of things still has its own limitations. In terms of cost, the cost of NB-IoT modules is expected to drop to less than \$5 in the future, but the current price of chips supporting the Bluetooth, Thread, and ZigBee standards is only around \$2, and the price of chips supporting only one of these standards is less than \$1. The huge price gap will undoubtedly make enterprises apprehensive about deploying NB-IoT.

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In addition, most of the IoT fields such as smart door locks and data monitoring do not require real-time wireless networking, but only near-field communication or through wired means. Is it worthwhile to replace narrowband internet of things?

The narrowband internet of things industry chain

Compared to the traditional industry, the industrial ecology of the IoT is relatively large and needs to be analyzed in two dimensions, the vertical industry chain and the horizontal technology standards. For low-power wide-area networks, from a vertical perspective, a complete industry chain has been formed from the underlying chip to the module, to the terminal, to the operator, to the application.

Almost all mainstream chip and module manufacturers now have clear NB-IoT support plans.

NB-IoT, [LoRa](#), Sigfox, ZETA, Ingenu are all branches of L PWAN. Technologies such as Lora and Sigfox operate in unlicensed bands and are mostly non-standard, custom implementations;

The more mature [2G/3G cellular communication](#) technologies such as [GSM](#), CDMA, WCDMA, etc. are technologies that work in the authorized frequency bands, and these technologies are basically defined in international standards organizations such as 3GPP (mainly for GSM, WCDMA, [LTE](#), and its evolutionary technologies) or 3GPP2 (mainly for CDMA-related standards).

At present, Huawei, Heisi, Qualcomm, Intel, MTK, ZTE Microelectronics, Datang, Spreadtrum, and other manufacturers have NB-IoT chip development plans and implementation steps, the original LTE chip capability of manufacturers can participate in the formation of the first 2-3 monopoly most of the market, but because the number of manufacturers in this field is not much, so will not form a large number of market participants, the market concentration will remain at 50%. The market concentration will remain below 50%;

In the LoRa camp, the supply of RF chips is currently concentrated in one vendor, Semtech, which occupies the majority of the market share, thus forming a market concentration of more than 80%.

In the module segment, due to the advantages of the channel, technology, and scale, many NB-IoT module shipments should be learned to hold in the original 2G/3G/LTE module product line manufacturers, the number of this group is relatively large, coupled with some new manufacturers into the field, it is also unable to form a high market concentration;

In the LoRa module group, the original vendors are mostly SMEs. With the increasing number of LoRa applications, there are still many players entering the market, making the whole market relatively competitive.

In the terminal segment, since low-power, wide-area network communication technology is required by a large number of industries and consumer terminals, and there are various types of terminals, it is impossible to form a market where a few companies own large-scale terminals, so the terminal market is extremely fragmented and the market concentration is low.

In the communication equipment and platform segment, Huawei, Ericsson, ZTE, Nokia, and other communication equipment manufacturers are the core participants and promoters of the narrowband internet of things standard.

In the cellular communication market, these mainstream equipment manufacturers occupy the majority of the market share, and inevitably occupy the majority of the share in the

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commercialization of narrowband internet of things, it can be said that the market concentration in this segment is high, probably reaching It can be said that the market concentration in this segment is high and may reach more than 80%;

For LoRa, a large number of SMEs have been involved in the R&D and production of LoRa base station equipment and management platforms since the beginning, and there are currently many vendors with the ability to provide overall solutions, thus not forming a high market concentration.

In China, the sharing model launched by ZTE China LoRa Application Alliance (CLAA) may improve the concentration of devices and platforms to a certain extent but still will not reach the high concentration of NB-IoT in this segment.

In the operator segment, it is clear that mainstream operators will deploy and operate NB-IoT networks, which means that future NB-IoT network operations will still be concentrated in the hands of the three major operators, so the market concentration in this segment is 100%;

For LoRa network operation, as it is necessary to meet the diversified needs of various government and enterprise industry users, there may be various forms of operators in the future, including CLAA's cross-regional cloud network operators, industry-level network operators, and enterprise private network operators, etc. Therefore, the market concentration is very low.

Application of narrowband internet of things

In the field of low-speed IoT, NarrowBand Internet of Things as a new standard, is the ultimate in technology in terms of cost, coverage, power consumption, and the number of connections. The technology can be widely used in industries such as public utilities, healthcare, smart cities, consumers, agricultural environment, logistics and warehousing, smart buildings, and manufacturing industries.

Both NB-IoT and LoRa networks have to face thousands of diverse application needs. These IoT applications cannot form a homogeneous business with hundreds of millions of applications as in the traditional communication era but are rather fragmented, and even in the same industry there are many different needs, so the application segment will not form a highly concentrated market.

In summary, it is obvious that the narrowband internet of things industry chain has a high degree of market concentration in many segments, and it can be seen that this field is more dominated by giants; the LoRa industry chain has a high degree of market concentration in the chip segment, while the other segments are all in the form of a large number of players.

Besides the Narrowband Internet of Things Technology article, you may also be interested in the below articles.

[About Wi-Fi, You Did Not Know](#)

[What is the difference between WIFI and WLAN?](#)

[Summary of 41 Basic Knowledge of LTE](#)

[What Spectrum Is Used In 5G?](#)

[What Is Wi-Fi 7?](#)

[How To Choose 2.4G And 5G?](#)

[What Are The Advantages And Characteristics Of NB-IoT And LoRa?](#)

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