

NFC for Consumers

What is NFC?

Near Field Communication (NFC) is a short-range wireless connectivity technology standard designed for intuitive, simple and safe communication between electronic devices. NFC communication is enabled by bringing two NFC compatible devices within a few centimeters of one another. Applications of NFC technology include contactless transactions such as payment and transit ticketing, simple and fast data transfers including calendar synchronization or electronic business cards and access to online digital content.

How will you experience NFC technology?

NFC makes life easier - it's easier to get information, easier to pay for goods and services, easier to use public transport, and easier to share data between devices. You simply bring NFC-compatible devices close to one another, typically less than four centimeters apart.

The benefits of NFC technology are so attractive that many branded service providers are using NFC technology to enhance their services and customer experience. NFC-enabled services are fast and easy to use without compromising existing service security.

What everyday machines and devices are likely to be NFC-enabled?

A wide range of devices and machines are likely to become NFC enabled. Here are some examples:

- Mobile phones
- Turnstiles
- Vending machines
- Parking meters
- Check-out cash registers or "point-of-sale" equipment
- ATMs
- Office, house and garage doors
- Personal computers
- Posters, street signs, bus stops, local points of interest (with NFC-readable tags only)
- Product packaging

How will NFC technology make life better in the future?

Thanks to NFC technology, we will be able to "pick up" information from our environment. NFC technology allows mobile devices to "read" information stored in "tags" on everyday objects. These can be affixed to physical objects such as posters, bus stop signs, street signs, medicines, certificates, food packaging and much more. You will know where to find the tag by looking for the NFC Forum "Target Mark" on the object.

Frequently Asked Questions

Here are some examples that show how NFC technology can help you capture information or trigger a chain of events.

- We all walk past billboards and posters advertising products, but how often do we remember to act on our interest? By adding NFC-compatible "tags" to posters and magazine advertisements, we can read the tags with an NFC-enabled phone and immediately act - before we forget.
- NFC tags can be used on special documents like parking permits, credit cards and money to prove authenticity. An NFC hologram is copy-resistant and can be cancelled if it is stolen.
- NFC enables simple and easy set-up of connections. For example, to connect a Bluetooth headset to a mobile phone, you just hold the devices close to each other and the connection automatically starts.

How will NFC technology make mobile payment and ticketing easier?

NFC enables contactless tickets and cards to be held in everyday devices like mobile phones. Instead of carrying several physical cards, you can choose to carry some or all of your cards within a personal device like an NFC-enabled mobile phone. Presenting an NFC device can make your life easier.

- NFC technology can enhance contactless payment at shop check-outs or unattended payment machines like parking meters. You can pay using virtual payment cards or e-money.
- Contactless tickets have revolutionized transport and event ticketing with their speed and flexibility. With NFC-enabled devices like mobile phones, you can buy tickets, receive them on your device and then go through "fast track" turnstiles while others wait. You can check your balance or update your tickets remotely.
- You can quickly download information (such as a bus timetable) by bringing your NFC-enabled phone or PDA close to a sign with NFC-readable information.

NFC technology is helping to increase the acceptance and usability of contactless services because it is based on an international standard, designed to work for any service, in any place, around the world.

What is the NFC Forum doing to address consumer privacy concerns?

NFC Forum technology is subject to the same privacy concerns and regulations as other data transmission technologies. The NFC Forum has created a Privacy Advisory Council to prepare Privacy Guidelines that will help educate the public and industry about the new issues raised by NFC Forum technology, and to explain how the industry standard principles of Notice, Consent, etc. can be meaningfully applied to NFC Forum technology.



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NFC for Business

What is the NFC Forum?

The NFC Forum is a not-for-profit industry organization, whose mission is to advance the use of Near Field Communication technology by developing specifications, ensuring interoperability among devices and services, and educating the market about NFC technology. One hundred fifty companies, many of them leaders in their markets, have teamed up to achieve this goal. More information can be found at www.nfc-forum.org.

How will NFC technology make business easier?

NFC technology provides simplicity and ease of use. End users or employees just hold NFC-enabled devices together to access services, interact with content, set up connections, make a payment or present a ticket.

Many corporations use contactless ID cards to control access to their facilities and networks. NFC can reduce the cost of card issuance and management. NFC-enabled devices can also simplify login to enterprise networks.

As NFC technology penetrates throughout the office, WLAN settings, printer IDs and even maps of the building can be picked up by NFC-enabled devices, allowing mobile workers to quickly get to work in any office location.

What are the commercial drivers for NFC technology?

There are four key reasons why NFC technology makes sense for service providers and device manufacturers.

- **Reduced cost of electronic issuance.** Multi-issue ticketing operators like mass transport operators or event ticketing operators see phenomenal cost reductions in electronic ticketing. Security-sensitive airlines have already moved to "e-ticketing" in order to reduce costs.
- **Increased revenue from interactive services.** Mobile network operators and content providers earn revenue when users choose to use value added services. NFC surrounds the user with advertisements and valuable information within easy reach.
- **NFC-enabled devices drive consumption of rich media content.** NFC will fuel the market for advanced personal devices that consumers use to purchase, play, store, and share rich media content.
- **Consumer preference for NFC-enabled services.** Users may have no choice about which ticket they use for a service, but they typically can choose how they pay. Convenience is a strong differentiator and more convenient payment will drive adoption of contactless and NFC technology.

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How long is NFC expected to be valued by the market?

NFC is based on existing contactless infrastructure around the world that is already in use by millions of people on a daily basis. NFC is not a fashionable nice-to-have technology, but actually a technology that makes peoples' lives easier – easier to pay for goods and services, easier to use public transport, and easier to share data between devices.

At the heart of NFC's benefits is its simplicity of use – holding two objects together is intuitive for everyone, young or old. NFC is building on existing systems and human actions, so it has a very good chance to be valued and used for many years to come.

When will we see broad market deployment? What is the forecasted opportunity for NFC?

- A recent study by ABI Research projects that 450 million mobile phones will be NFC-enabled by 2011, representing nearly 30% of handsets shipped worldwide in that year.
- Strategy Analytics forecasts mobile phone-based contactless payments will facilitate over \$36 billion of worldwide consumer spending by 2011.
- According to research firm Frost & Sullivan, one third of all mobile phones will be NFC-equipped in a span of three to five years

In Japan, NFC 212 kbps passive mode contactless technology has already been implemented with payment as a killer application.

About NFC Technology

How does NFC technology work?

Near Field Communication is based on inductive-coupling, where loosely coupled inductive circuits share power and data over a distance of a few centimeters. NFC devices share the basic technology with proximity (13.56MHz) RFID tags and contactless smartcards, but have a number of key new features.

How does NFC technology build on existing technologies?

NFC devices are naturally interoperable, as NFC is based on pre-existing contactless payment and ticketing standards that are used on a daily basis by millions of people and devices worldwide. These standards determine not only the "contactless" operating environment, such as the physical requirements of the antennas, but also the format of the data to be transferred and the data rates for that transfer.

Which standards organizations acknowledge NFC technology?

NFC Standards are acknowledged by ISO/IEC (International Organization for Standardization / International Electrotechnical Commission), ETSI (European Telecommunications Standards Institute), and ECMA (European association for standardizing information and communication



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systems). The Wireless USB Promoter Group will incorporate "touch-and-go" NFC technology into the second specification of Wireless USB, version 1.1. And recently, the Wi-Fi Alliance introduced NFC as the one of four ways to configure home networks.

What ISO/IEC standards do the NFC Forum specifications support?

NFC Forum compliant devices in NFC Forum Reader/Writer mode must support the RF requirements for ISO/IEC 14443A, ISO/IEC 14443 B and FeliCa as outlined in the relevant parts in the ISO 18092.

What are the data transmission rates?

NFC data transmission is measured in Kilo Bits Per Second (kbps). The NFC standard supports varying data rates, again to ensure interoperability between pre-existing infrastructure. The current data rates are 106kbps, 212kbps and 424kbps.

What is the difference between an NFC-enabled device and an NFC tag?

An NFC-enabled device can operate in reader/writer and peer-to-peer mode, and may operate in card emulation mode. An NFC tag is typically a passive device (for example, integrated in a smart poster) that stores data that can be read by an NFC-enabled device.

What is the difference between a card and a tag?

A card and a tag are technically the same. However, contactless cards used in ticketing and payment today include additional technology to store secure data.

How is NFC different from or related to other wireless/RF technologies?

Near Field Communication (NFC) is a standards-based, short-range (a few centimeters) wireless connectivity technology that enables simple and safe two-way interactions among electronic devices, allowing consumers to perform contactless transactions, access digital content and connect electronic devices with a single touch.

Bluetooth wireless technology was designed to replace cables between cell phones, laptops, and other computing and communication devices within a 10-meter range.

Wi-Fi technology was designed and optimized for Local Area Networks (LAN); it provides an extension or replacement of wired networks for dozens of computing devices within a +100-meter range.

ZigBee wireless technology is a standard enabling control and monitoring capabilities for industrial and residential applications within a +100-meter range.

IrDA is a short range (< 1 meter), line-of-sight communication standard for exchange of data over infrared light. IrDA interfaces are frequently used in computers and mobile phones.

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RFID (Radio Frequency Identification) is an automatic identification method, relying on storing and remotely retrieving data using devices called RFID tags. An RFID tag is a small object that can be attached to or incorporated into a product. RFID tags contain silicon chips to enable them to receive and respond to queries from an RFID reader/writer.

Contactless smart cards incorporate a chip (microprocessor) that communicates with a card reader through RFID technology. Examples of contactless smart card communications are ISO/IEC 14443 and FeliCa, which allow communications at distances up to 10 cm.

What are the operating modes of NFC devices?

NFC devices are unique in that they can change their mode of operation to be in reader/writer mode, peer-to-peer mode, or card emulation mode. The different operating modes are based on the ISO/IEC 18092 NFC IP-1 and ISO/IEC 14443 contactless smart card standards.

- In reader/writer mode, the NFC device is capable of reading NFC Forum mandated tag types, such as in the scenario of reading an NFC Smartposter tag. The reader/writer mode is on the RF interface compliant to the ISO 14443 and FeliCa schemes.
- In Peer-to-Peer mode, two NFC devices can exchange data. For example, you can share Bluetooth or WiFi link set up parameters, and exchange data such as virtual business cards or digital photos. Peer-to-Peer mode is standardized on the ISO/IEC 18092 standard.
- In Card Emulation mode, the NFC device itself acts as an NFC tag, appearing to an external reader much the same as a traditional contactless smart card. This enables contactless payments and eticketing, for example.

NFC Forum Specifications

Which specifications have been issued?

The Forum has issued 11 specifications to date:

- NFC Data Exchange Format (NDEF) defining a common data format between NFC-compliant devices and tags
- Record Type definitions (RTD) and four specific RTDs (Text, URI, Smart Poster, Generic Control) for building standard record types
- Four Tag Types (1/2/3/4) which enable core interoperability between tag providers and NFC device manufacturers
- Connection Handover defines the structure and sequence of interactions that enable two NFC-enabled devices to establish a connection using other wireless communication technologies. It enables developers to choose the carrier for the information to be exchanged. If matching wireless capabilities are revealed during the negotiation process between two NFC-enabled devices, the connection can switch to the selected carrier.



Frequently Asked Questions

Which specifications will be issued next?

Work on new specifications is well underway. As a not-for-profit organization, with many members contributing different input and views, it takes time for the NFC Forum to reach agreement and progress toward our goals. In addition to more record type definitions, the next specifications to be issued will address the NFC Controller Interfaces and LLCP.

Do I need to be an NFC Forum member to get the NFC specifications?

It is in the best interest of the NFC Forum to make its specifications and technology widely available, so you do not have to be a member to get them. Naturally, we welcome new members who can contribute their knowledge and support to the NFC Forum.

Will you license the NFC Forum specifications? If so, under what terms? What will you charge for the specifications?

Wide use of the NFC Forum specifications is better for the whole ecosystem. Work is now underway in the NFC Forum to develop guidelines for usage and licensing. We cannot provide details about costs, but you can expect the NFC Forum to take a reasonable approach.

NFC Forum Intellectual Property Rights (IPR) Policy

Why does the NFC Forum have an IPR policy at all?

As an association, the NFC Forum does not want to adopt a specification that would infringe on patents that are not licensable. The IPR Policy establishes processes that ensure that all members commit to license their essential patents in specifications at Reasonable and Non-Discriminatory (RAND) conditions.

What intellectual property is covered?

Any patent is covered which is either essential for the specification itself or for any direct reference to an underlying technology included in the NFC Forum specifications.

When are members asked to license their intellectual property?

IPR election forms need to be provided when a member proposes a technical solution in a Working Group and also during the review and adoption process for the specification.

Do members have to license their IPR?

No, members have the right to refuse to license their patents, and a simple declaration in the IPR election form is sufficient. However, specifications with non-licensable intellectual property are likely not to be adopted, and work will be started within the Forum to avoid the non-licensable patent.

Frequently Asked Questions

Which patents are not covered by the NFC Forum IPR Policy?

Not included are:

- Patent claims that are controlled by companies or individuals that are not Members of the NFC Forum
- Patent claims that are related to NFC Forum Specifications, but that are not Necessary Claims (i.e. not 'essential')

Are member companies compensated for licensing their patents?

Members may request compensation under RAND terms.

Are pending patents included?

Yes, this policy covers both approved and pending patents.

What if a member does not wish to license their patents?

The member needs to identify the non-licensable patent in the IPR election form submitted during the adoption phase. In the case of any refusals to license, the appropriate committee must try to find alternative solutions.

Do new members have to review patents that might apply to specifications written before they joined?

Yes. New Members must provide IPR election forms for all existing and draft specifications for which the existing membership has already been asked to provide their IPR forms.

What is the process for members?

IPR election forms are in the IPR Policy document, which is on the member site at www.nfc-forum.org/members/legaldocs/NFC_Forum_IPR_Policy.pdf. Members do not need to do a patent search, nor do they need to indicate any specific IP they own.

Who owns the copyright in specifications?

The NFC Forum owns the copyright in its specifications, but Members still own the copyright in their individual submissions.

What is the Forum's role?

Since members do not have to identify their specific patents, the NFC Forum does not maintain a list and does not give advice or guidance on any specific claim.



Frequently Asked Questions

NFC Forum Testing

Will the NFC Forum define test specifications?

We expect to release information about test specifications in 2009.

How will the NFC Forum ensure interoperability?

Interoperability is an important goal of the NFC Forum. We are currently working on approaches to ensuring interoperability and we expect to release more information this year.

The NFC N-Mark

How do I recognize an NFC device or target?

The NFC N-Mark can appear on NFC-enabled devices and on everyday objects. It marks the spot on devices or objects where NFC technology works when they are brought close together. For example, you can bring a mobile phone near a poster to download information.

The N-Mark may also include an icon that indicates the type of service you'll trigger or information you'll receive from that mark.

Where can I get the N-Mark?

[Visit the N-Mark webpage.](#)

Where is the N-Mark in use?

The N-Mark has been used by various NFC Forum members in trials and projects around the world.