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Spontaneous Proximity Networking with Piano-enabled Devices

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What is Piano?

- Motorola code name for short-range spontaneous wireless network
- Based on short-range wireless medium
- Networks are transient, formed as needed when devices come into proximity
- Peer-to-peer without a designated controller
- Supports but does not require a connection to the internet/intranet

The Motorola Vision for Piano

- A future in which many electronic devices (enabled with Piano) are:
  - *aware* of other nearby Piano-enabled devices
  - have the capability of *communicating* with other *discovered* Piano-enabled devices
  - *automatically exchange* basic information about fundamental capabilities
  - establish temporary wireless networks, as appropriate

Piano-Enabled **Public** Applications

- Context /Location-specific triggers
- Kiosks - printing, information transfer
- Queue reduction - hotel, theater, restaurant
- Universal User Interface - thin servers
- E-commerce
- Matchmaker services

Principal Features of Piano Networking

- Short-range wireless medium
- Peer-to-peer device discovery
- Peer-to-peer service discovery
  - User oriented service description
  - Device oriented service description
- Client distribution for discovered services
- Peer-to-peer authentication/authorization

Short-range Wireless Medium

- Omni-directional – permits hidden, automatic operation (I.e., briefcase computing)
- Low power consumption – permits small size, portable operation
- Limited range – frequency sharing through spacial isolation
- Low-cost – enables ubiquity
- Wire equivalent privacy – protection from eavesdropping and spoofing

Peer-to-peer Device Discovery

- Each device can detect and communicate with ***all*** nearby devices.
- Devices operate as peers without the use of a central controller.
- Devices can begin communicating without device-specific configuration or human interaction.
- Device associations are temporary.

Peer-to-peer Service Discovery

- Enables users to see available services
  - provides enough information for user to decide if further interaction is desired
- Enables devices to automatically utilize recognized services
- Provides information on service protocols and connection parameters
  - sufficient to establish a session with the service
- Distributed naming of services

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Service Discovery (continued)

- Service naming separate from device naming
- Service grouping and categorization
- Asynchronous notification when a requested service enters proximity
- Protocol support for caching of service attributes
- Incremental discovery based on authentication/authorization

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Client Distribution for Discovered Services

- Enables service-specific user interfaces for multiple services without pre-configuring a client for each service
- Enables a service-specific user interface for newly encountered services
- Clients may be downloaded on demand from the internet/intranet, from the server offering the service, or may be pre-loaded

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Summary

- The Motorola Piano team has focused on the “things you come near” aspect of short-range wireless networking (I.e., Personal Operating Space)
- Piano Goal: work within Bluetooth and the IEEE to standardize the Egalitarian, ad hoc networking protocols and Application Programming Interfaces.