Introduction

Definition: The use of portable computer devices to connect to business computer networks by means of wireless connections. (Bitpipe)

• users carrying portable devices have access to data and information services regardless of their physical location or movement behavior.
Location Based Services

- i.e. locating the 5 closest restaurants to you
- Accessed through a common wireless channel
- 2 ways of access:
  - on demand access - per query basis
  - broadcast access

Problems

- Limited bandwidth
- Limited Battery Life
- Ability to locate users and direct them to the right server

Existing Middleware

Object Oriented

- Such as CORBA, DCOM and Java RMI.
- IIOP (Internet Inter-ORB Protocol) insures that the connection remains established transparently.
- RAPP, DOLEMEN - alternative methods for supporting CORBA in the wireless environment
- Mobile DCE - demonstrates that remote procedure calls could be utilized by mobile applications
Existing Middleware

However!
All of these assume permanent connectivity!

• Alternative way: event notification. Consumers subscribe they are interested in. Such as ELVIN, Siena and iBus.
• ELVIN has been modified to prevent clients that frequently disconnect from losing events.

BUT…

Existing Middleware

They all require connection to the same proxy, which is not possible!
Existing Middleware

- Tuple space systems that act as a repository of data structures called tuples that process can concurrently access.
- Communication is de-coupled so that senders and receivers do not need to be available at the same time. (Lime, TSpace)

New Approaches

- Awareness of the context in which the middleware is used

Mainly: User context

User Context

- Location - varying accuracy
- Relative Location - such as proximity to printers
- Device Characteristics - processing power and input devices
- Physical Environment - such as noise level and bandwidth
- User Activity - driving a car or sitting in a lecture

FOCUS: Location Information
New Approaches

- Interact directly with the underlying network OS to extract location
- BUT: do not cope with the coordinate system such as Global Positioning System (GPS)

GPS

General location systems divide into:

- Providing highly accurate location estimates (order of centimeters) within a small area
- Or lower accuracy within a large area.

GPS

- GPS provides a wide area coverage
- Uses low-orbit satellites and covers the entire earth.

Disadvantages:
- Coverage is limited
- Cannot penetrate through most buildings

Usability:
- Mostly in navigation systems
- Little use in other applications
Paradigms for Mobile Computing

- Event Based Communication Model
- Proximity Based Communication

Event Based

- Asynchronously connects the components that comprise and application in a distributed environment
- Supports: one-to-many, many-to-many communication patterns
- Allows one or more application components to react to a change in the state of another application
- Well suited for addressing the requirements of the mobile computing domain
- Avoids centralized control and long-lasting potentially expensive connections

Proximity Based Communication

- Provides one-to-many or many-to-many communication patterns
- Allows a member of the group to send messages to all the members of that group
- Can be used by producers to propagate messages to the consumers
- Proximity groups allow mobile application components to join a proximity group and interact with its members