Ultra Wideband for Precise Positioning

Insight SIP 10th Anniversary Conference 2016
• Ultra-Wide band - What is it, and what is it good for?
• A brief history of the rise, fall and rise again of UWB
• New solutions in Ultra-Wide Band
• Insight SIP’s UWB offer
What is UWB?

- A method of transmission, not a standard
- Not new - first used by Marconi in 1901!
- Transmits over a large bandwidth, allowing sharing with other users
- More precise terms FCC/ITU-R Defn:
  
  "transmission for which emitted signal bandwidth exceeds the lesser of 500 MHz or 20% of fractional bandwidth"

- Two main types - Pulsed and traditional carrier based methods
Notches, or any type of filtering, field-configurable throughout the band to eliminate interferers.

Programmable analog filtering

3.7 – FSR-UWB band, GHz – 10.0 GHz

3.4 – 3.6 GHz: WiMAX

3.65 – 3.7 GHz: Contention Based Wi-Fi, WiMAX

5.15 – 5.35 GHz: UNII Band

5.725 – 5.825 GHz: UNII/ISM Band

5.15 – 5.35 GHz: Wi-Fi

5.725 – 5.825 GHz: Wi-Fi, WiMAX

Traditional wireless services

Ultra Wide Band (UWB)

3.1 – 10.6 GHz
• UWB transmits over wide bandwidth at low power
• Allows high data rate, whilst keeping radio interference to a minimum
• Ultra high data rate
• Timed well defined pulse
• For data transmission, range limited, line of sight
Various Vendors produced chipsets
- Stacatto
- Alereon
- Wisair

Transfer Jet protocol being promoted in some territories (e.g. Japan / APAC)

Overall, “solution in search of a problem”

Increasing bandwidth of Mobile/Wi-fi satisfying users, no need for new radio

Battles over standards hindered market adoption
• New of companies with UWB chipsets
  - Decawave - DW1000 in production
  - BeSpoon
  - 3DB Labs/ CSEM
• Application - precise positioning
• UWB Pulse technique
• Time of Flight based measurement
GPS

+ points

• Well established, low cost
• No special infrastructure required
• Already in most phones

- Points

• Doesn’t work indoors
• Accuracy variable, affected by buildings
Bluetooth / Beacons / Wifi Access points

- Points
  - May be able to use existing infrastructure
  - Can use BT / WiFi in phones
  - Cheap

- Points
  - Limited accuracy, based on signal strength
  - Requires custom software / configuration
  - Accuracy drops off badly with range / obstacles
UWB Positioning

+ points

- High accuracy +/- 10cm
- Accuracy range independent, range up to 100 - 200m
- Fast - real time tracking possible

- Points

- Requires custom infrastructure
- Need hardware at both ends
- Relatively expensive

UWB for Precise Positioning - Nick Wood
APPLICATIONS

- High value asset tracking
- People tracking / gate
- Secure entry / transaction
- Vehicle keyless entry
- Healthcare
Why Now?

- Concept is hardly innovative
- UWB chipsets been around for many years
- Positioning now a mature technology
- Applications available
- Value chain in place
• Significant track record in UWB
• High speed UWB SIP developed for mobile phone customer
• New module based on Decawave chipset to be released Q3 - positioning application
• Also developing module based on 3DB labs / CSEM chipset
Combo module incorporating:

- Decawave DW1000
- nRF52 Nordic BLE
- ARM M4 FP processor (in nRF52)
- UWB patch antenna 6-8 Ghz
- BLE antenna 2.4 Ghz
- All RF passives/ matching etc
- To be certified FCC / CE / TELEC etc
• Insight SIP module has unique patented Antenna Technology
• Multimode patch antenna integrated into the module
• Covers 6-7.5 GHz frequency range
• Overall size reduction of 2-4 times over conventional solution
• Very easy to use for electronics designers
• Smart-secure device
• BCC - Body capacitive coupling - touch object, ensure human contact
• UWB - Precise proximity / location
• Secure element
• Fingerprint sensor
Technology has a chequered history
Useful technique to exploit valuable spectrum
Precise indoor/ localised positioning shows real promise as application
Market will decide....