



gpsOne™ Enabled LBS

A North American Case Study

Presented by Sam Knight
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TechnoCom and SnapTrack[®]

TechnoCom is part of *every*
CDMA gpsOne[™] deployment in
North America

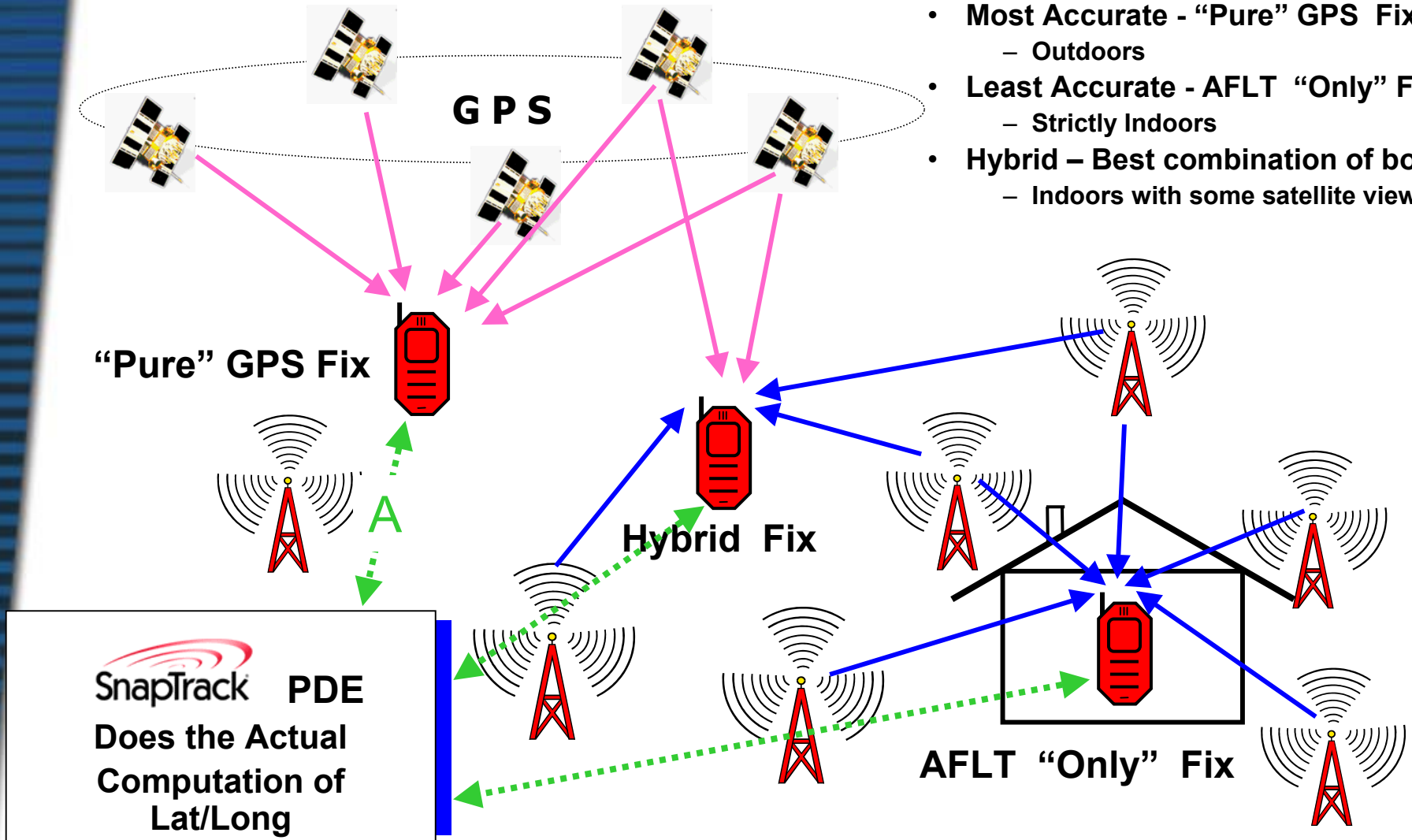


Strength of Partnerships

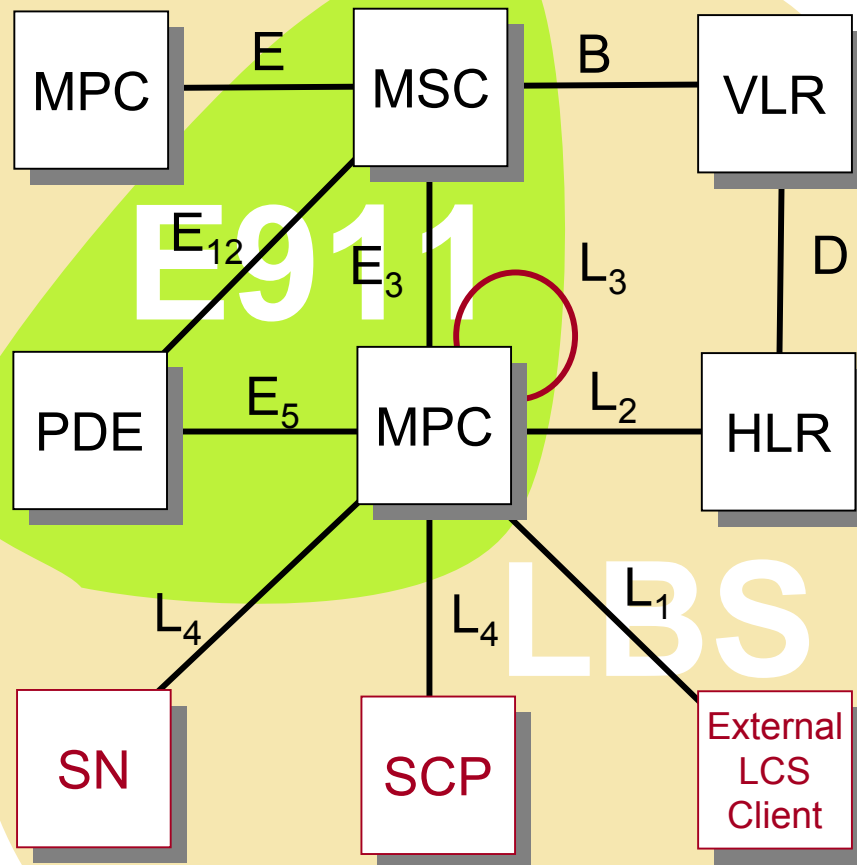


30-Second AGPS Tutorial

- Most Accurate - "Pure" GPS Fix
 - Outdoors
- Least Accurate - AFLT "Only" Fix
 - Strictly Indoors
- Hybrid – Best combination of both
 - Indoors with some satellite view



Interoperability of Network Elements



LBS Network

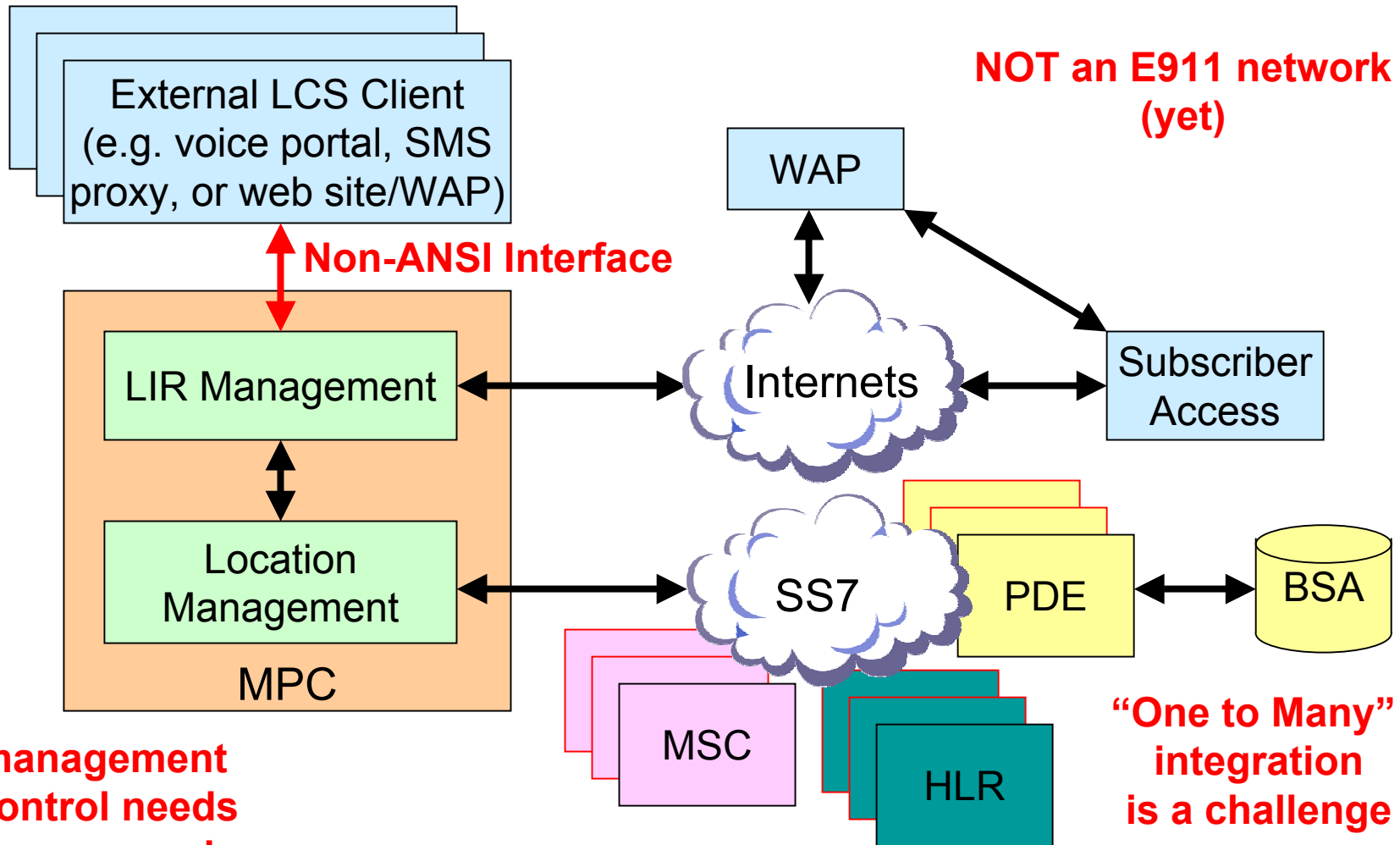
- LBS “L” interfaces not yet standard
- IP-based LBS technically “easier”, less robust
 - Less privacy protection
 - Service billing capture

E911 Network

- E911 interoperability testing was challenging
 - Standards variability
 - Required independent step-wise test platform
- E911 now “plug and play”

Diagram courtesy of TIA PN-4747 / 3GPP2 N.P0013

Case Study LBS Network Diagram



LIR management and control needs much more work

“One to Many” integration is a challenge

Performance Requirements: LBS vs. E911

- **ACCURACY**
 - LBS business case can require *more* or *less* accuracy
 - LBS Trial Application: Find company store service
 - Less location accuracy required
 - AT&T's Friend Finder is low accuracy (cell/sector)
 - E911 or "Help, I've fallen and I can't get up!" needs high accuracy
 - FCC gives explicit 50/150 meter (66%/95%) E911 accuracy
- **RESPONSE SPEED**
 - High LBS user expectation: Location delivered like Caller ID
 - E911: A "little" more time is worth greater accuracy
- **MOBILE STATION PERFORMANCE**
 - Constant tracking applications and battery drain
 - LBS Location feedback may require handset graphics display
 - LBS and E911 voice/text display to user/dispatcher sufficient

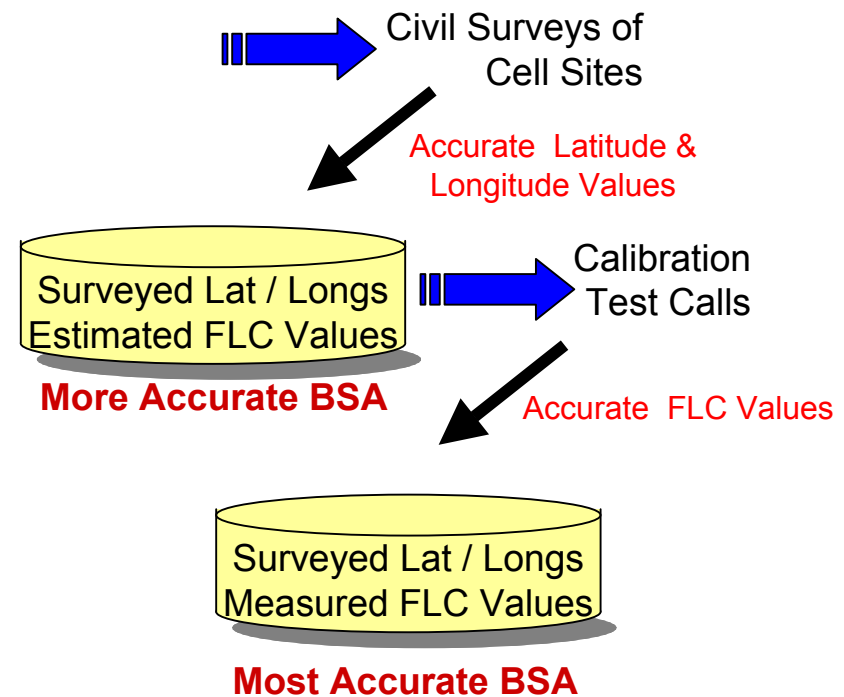
What and Why a Base Station Almanac?

**BSA is THE controlling data definition for PDE computations.
Cell site identifiers, RF assignments, pilot signals,
lat/long of cell site, etc...**

BSA quality investment is proportional to total network accuracy

Base Station Almanac () Experiences

- Carriers initial BSA challenge
 - Multiple sources & format
 - Changing RF networks
- Solutions Developed
 - Tailored translation tools
 - Integrated RF database
- AFLT Calibration Targets
 - Intelligent selection of sites
 - Performance prediction
 - Business demands for accuracy
- Solution Required:
 - Marketing and engineering must talk!



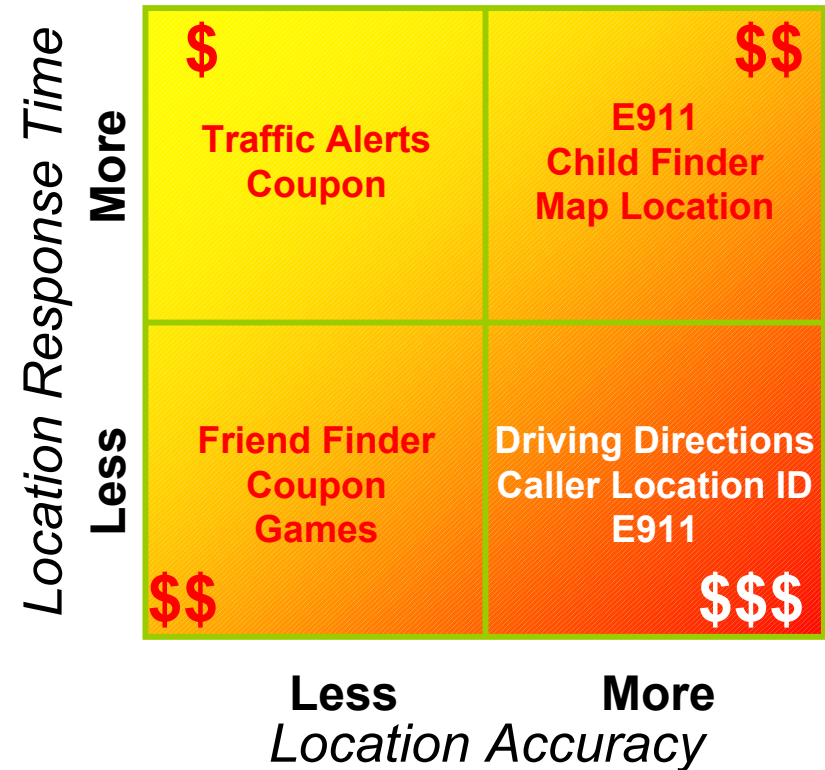
Carrier's Cost of Accuracy

State of the Art

- Sector Centroid = cost of entry
- AGPS = gpsOne™ cost of entry
- AFLT = site survey and calibration
- Hybrid = requires AFLT calibration
- Regionalized Accuracy

Deployment Options:

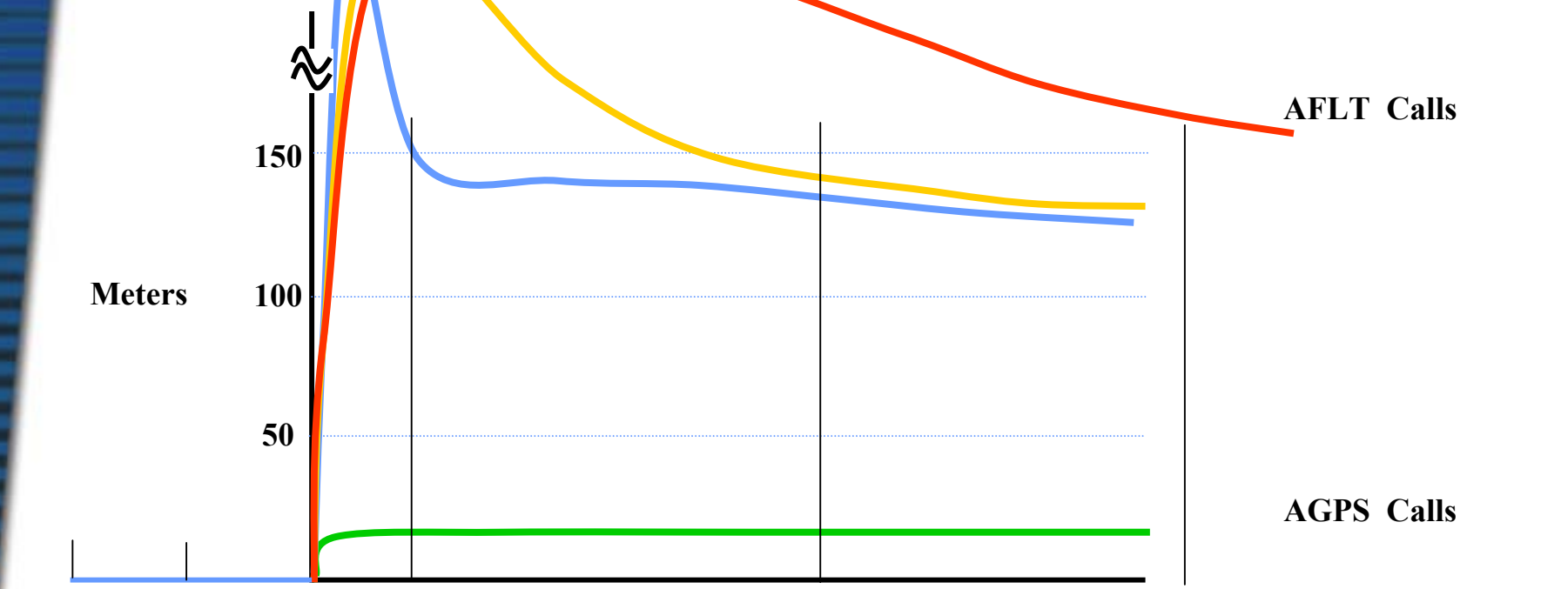
- Optimize LBS to the on-demand location opportunities
- Optimize the efficiency of calibration and plan for 100% calibration



\$\$ = What the carrier has to pay to achieve target accuracy

Network Accuracy Timeframes

AGPS Call Accuracy OK With Default Data
AFLT Calls Require Accurate Site Locations
AFLT Calls Require AFLT Measurements
Subscriber Calls Can Be Used for Analysis



(Time Scale Is Market-Size Dependent)

- Using Subscriber Calls (Site Surveys and User Calls)
- Automated Calibration (Site Surveys and Automated Calibration Calls)
- Dedicated Calibration Effort (Site Surveys and Calibration Calls)
- AGPS Location Accuracy (No Surveys or Calibration Calls Needed)

Sustaining Location Performance

- RF networks change over time
- “Corner Cases” should be considered
 - Repeaters, special coverage areas
- Retesting and recalibration required
 - Options:
 - Periodic Spot checking, or
 - Continuous Validation and Recalibration
- Solution: Background network verification and recalibration via InterOps SafeGuard[™]
- Solution: Integrated data management that triggers network changes reflected into the BSA

Summary and Key Lessons

- Get a grip on the BSA
- A good start (verification step) makes the trip much easier
- Build Location Deployment into the overall network process
- Plan for near 100% calibration, at least over time
 - LBS will demand it
- “Where am I now?” will be the next advertisement mantra for mobile carriers



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