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July 30, 2015

Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

**Re: *Ex parte* presentation in IB Docket No. 12-340; IBFS File Nos.
SAT-MOD-20101118-00239; SAT-MOD-20120928-00160;
SAT-MOD-20120928-00161; SES-MOD-20121001-00872**

Dear Ms. Dortch:

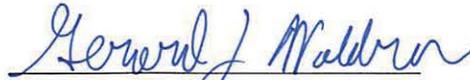
On July 28, 2015, Reed Hundt and the undersigned, representing LightSquared, met with Jon Chambers (OSP), Charles Mathias (WTB), Jennifer Tatel (OGC), Paul Murray (OET), Ron Repasi (OET), Bob Nelson (IB), and Karl Kensinger (IB) to discuss the attached presentation. We explained that company research shows consumers today are overwhelmingly using smartphones for general location and navigation use cases, and as a result, the number of personal navigation devices (PND) being sold is declining rapidly and those in actual use are also shrinking. We then discussed the relatively limited number of devices in high precision agriculture and construction when compared with the total industry installed base and reviewed data concerning the installed base and estimated number of units of high precision units in the installed base in 2020. We also reviewed how companies increasingly are using other solutions to compensate for GPS limitations, including inertial measure units (IMUs) and real time kinetics (RTK).

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Please direct any questions to the undersigned.

Sincerely,

A handwritten signature in blue ink that reads "Gerard J. Waldron". The signature is written in a cursive style with a horizontal line underneath the name.

Gerard J. Waldron
Counsel to LightSquared

cc: Jon Chambers
Charles Mathias
Jennifer Tatel
Paul Murray
Ron Repasi
Bob Nelson
Karl Kensinger

Attachment

Topics

- **Overview of GPS market**
- **Market facts and projections**
- **Technology evolution**

Five GPS applications

Application	Devices	Overall market trends
General location/Navigation 	<ul style="list-style-type: none"> ▪ Personal navigation devices (PNDs) ▪ In-dash navigation systems ▪ Wearables ▪ Outdoor devices ▪ Marine navigation ▪ Asset tracking ▪ Public safety 	<ul style="list-style-type: none"> ▪ The market for navigation devices is changing: <ul style="list-style-type: none"> – Smartphones are replacing many consumer navigation devices (e.g., PNDs) – Wearables are a growing segment but the base is very small – High-precision segment is growing slowly (1-2% per year) if at all – GPS is no longer the only source of location information – Many devices are no longer GPS-only and rely on additional technology for improved accuracy and performance, such as assisted GPS (cellular triangulation), inertial measurement units (IMUs), radars, sensors, barometers, and Wi-Fi
Cellular 	<ul style="list-style-type: none"> ▪ Smartphones ▪ Tablets 	
High precision 	<ul style="list-style-type: none"> ▪ Agriculture devices ▪ Construction devices ▪ Surveying & Mapping devices 	
Aviation 	<ul style="list-style-type: none"> ▪ Certified devices (for air carriers and general aviation) ▪ Non-certified (i.e., portable devices) 	
Timing 	<ul style="list-style-type: none"> ▪ Timing receivers (for communication networks, financial services, energy) 	

The overwhelming preponderance of GPS devices are in smartphones

GPS devices in the US

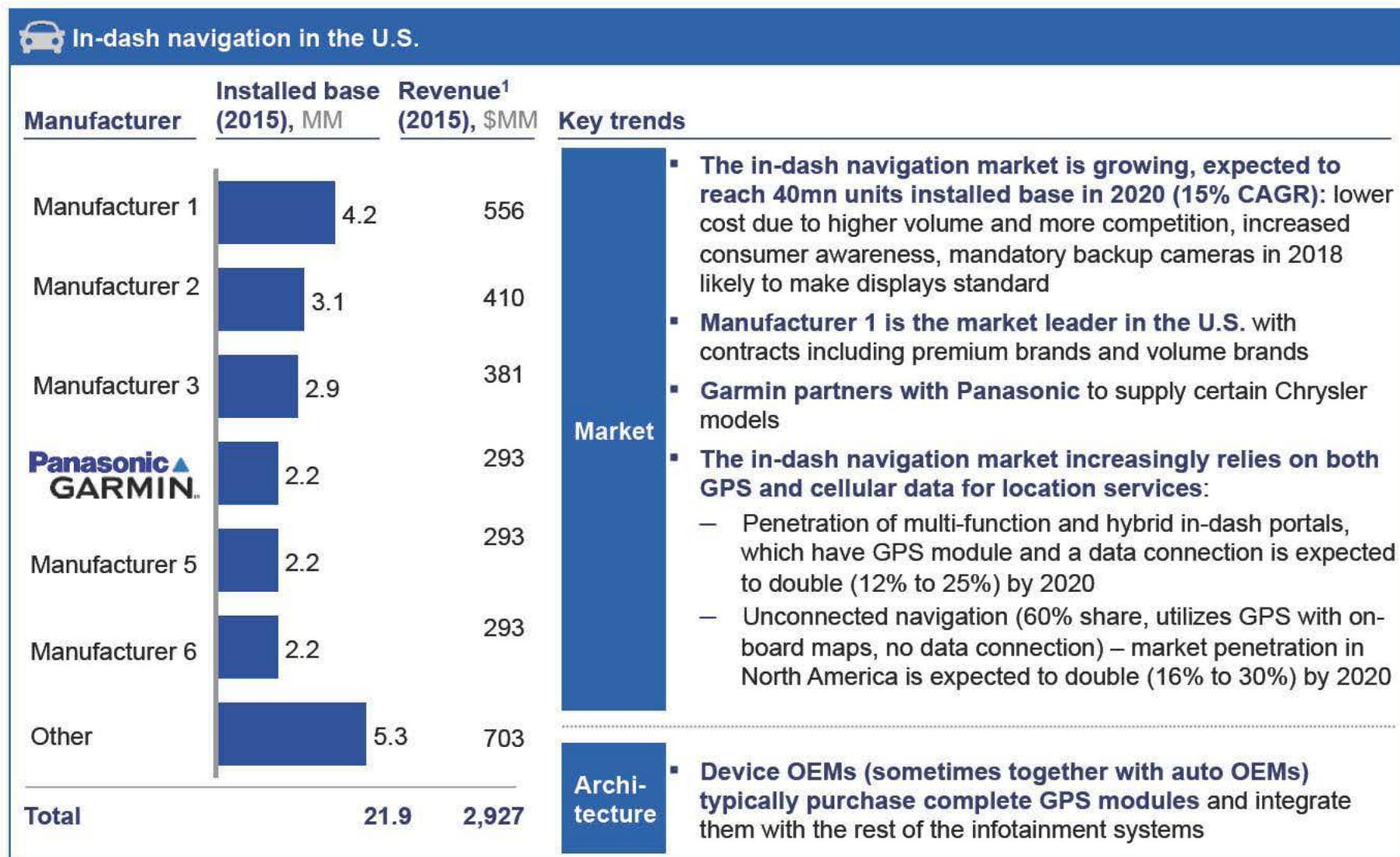
Applications	Installed base, MM units		Units sold	Revenue	
	2015	2020	2015, MM units	2015 ¹ , \$MM	
GLN 	▪ In-dash	22	43	4.9	2,927
	▪ PND	14	7	5.3	656
	▪ Asset Tracking	8	23	1.2	477
	▪ Wearables & Outdoor	9	28	6.3	3,187
	▪ Marine Navigation	4	4	0.5	353
	Total	57	105	18.2	7,600
Cellular 	▪ Smartphones	223	264	169	80,142
	▪ Tablets	97	170	35	12,944
	Total	320	434	204	93,086
High Precision 	▪ Surveying	0.2	0.3	0.05	519
	▪ Precision Agriculture	0.1	0.2	0.03	356
	▪ Heavy Construction	0.1	0.1	0.03	418
	Total	0.5	0.6	0.11	1,293
Aviation 	▪ Certified Devices	0.13	0.13	0.015	224
	▪ Non-certified	0.04	0.04	0.005	6
	Total	0.17	0.17	0.02	230
Timing 	▪ Timing	<1 ²	<1 ²	0.02 ²	N/A
	Total	<1	<1	0.02	N/A
Total	379	540	222	102,000	

1 For in-dash, marine navigation, all high precision applications, and installed aviation revenue is calculated for GPS receiver only. For the rest of the categories, the revenue is calculated for the entire device.

2 Preliminary estimate

Source: Euromonitor, IHS, IDC, CEA, news sources, expert interviews, internal estimates

For in-dash navigation, the market is expected to rely on cellular data

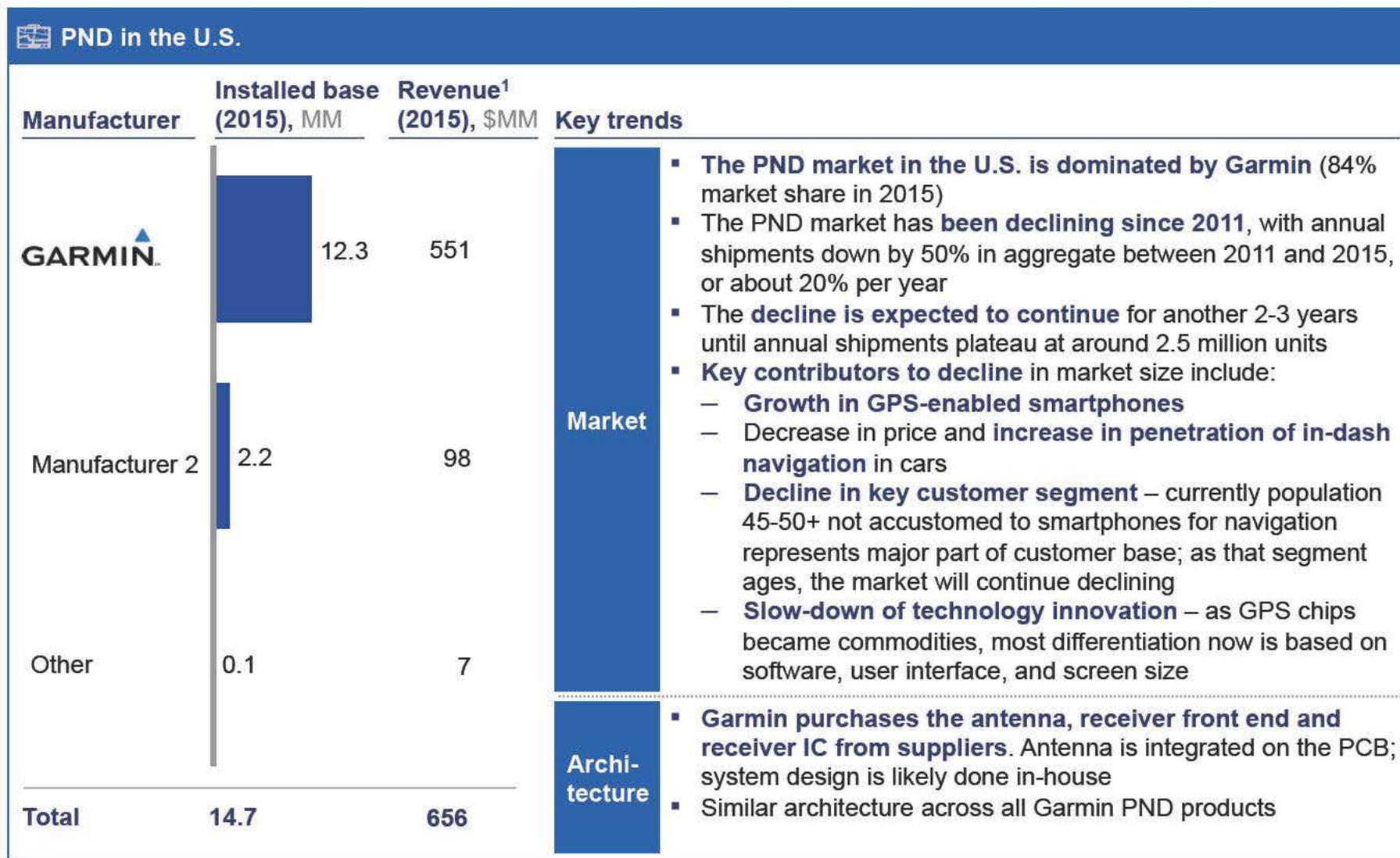


1 Includes revenues from infotainment units with navigation only; ASP = \$600.

2 Based on data for North America

SOURCE: Euromonitor; Citi GPS Report; HIS; expert interviews; internal estimates

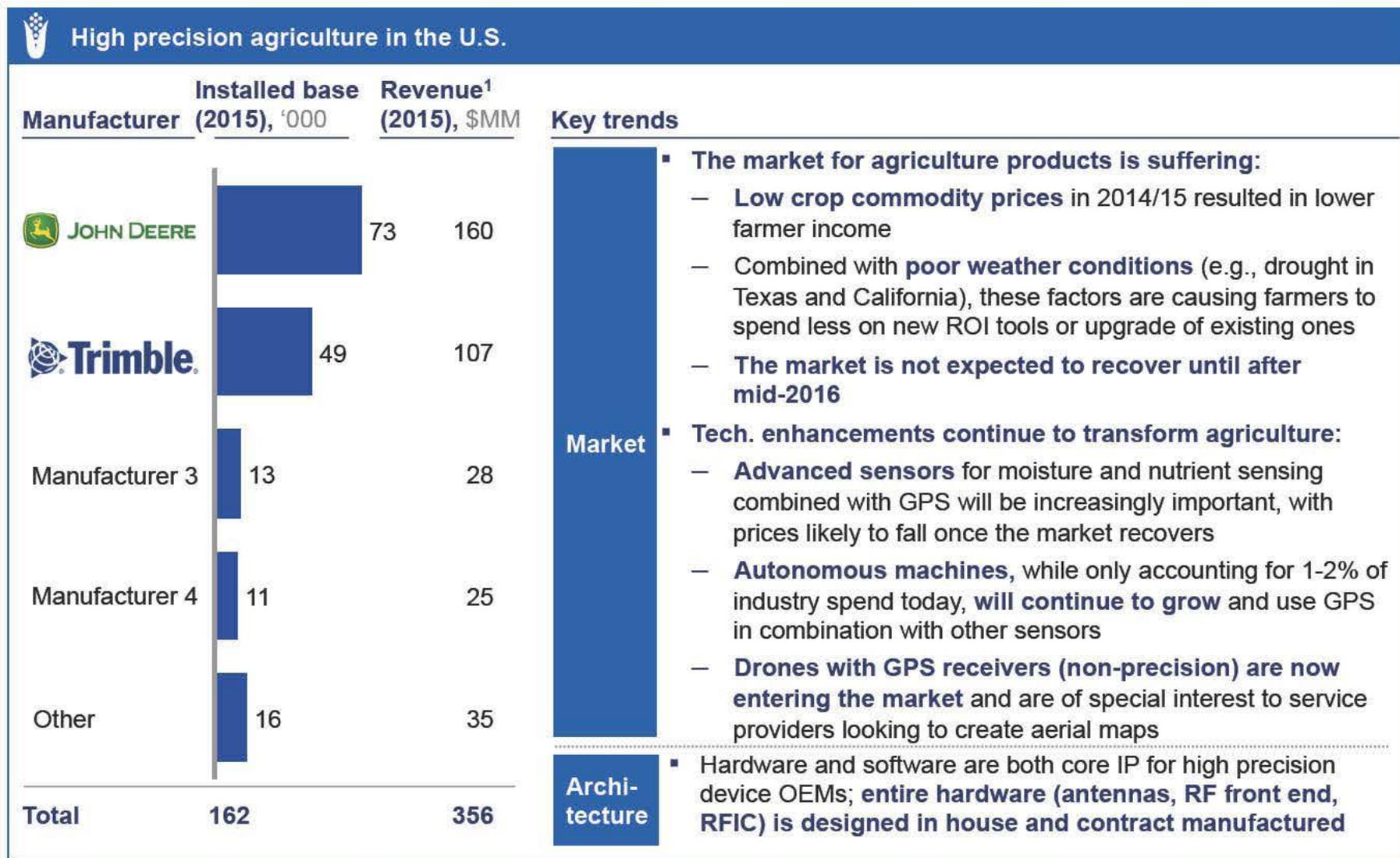
For PNDs, the market has been declining since 2011



¹ Includes revenues from infotainment units with navigation only; ASP = \$125. Projected revenue for 2015.

Source: Euromonitor; Citi GPS Report; HIS; expert interviews; internal estimates

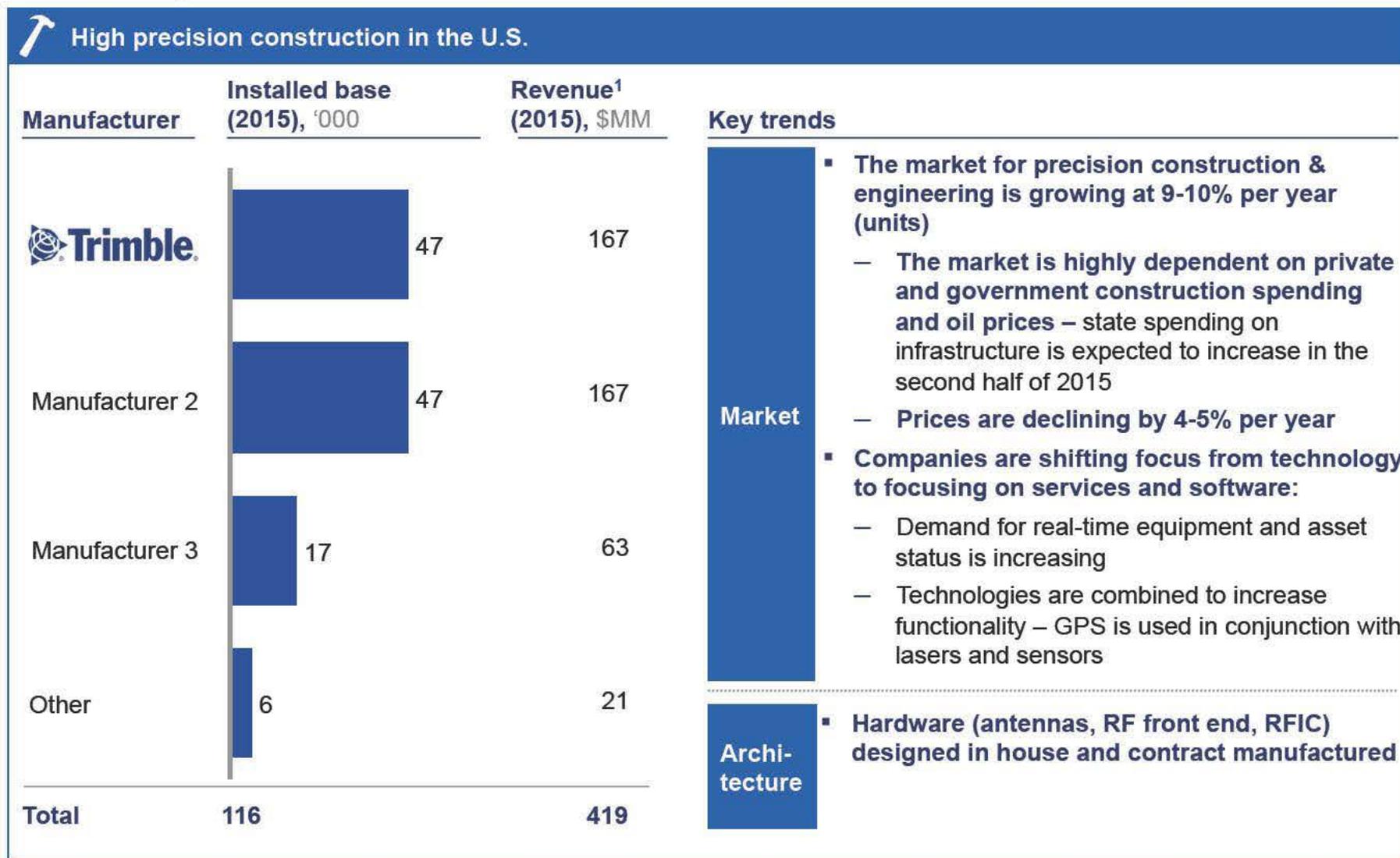
The market for high precision agriculture is down due to low commodity prices and poor weather conditions



¹ Includes revenues from GPS receivers only; ASP = \$13K.

SOURCE: Analyst reports, expert interviews, internal estimates

The market for high precision construction GPS is growing but prices are expected to fall



¹ Includes revenues from GPS receivers only; ASP = \$14K.

SOURCE: Euromonitor; Citi GPS Report; HIS; expert interviews; internal estimates

To overcome GPS limitations, OEMs deploy additional technologies

Instances where GPS is limited

- **Urban canyons:** Fewer visible satellites results in delayed and inaccurate location
- **Indoors:** GPS not ideal for navigating covered spaces – Malls, warehouses, airports
- **Self-drive cars/ADAS systems:** GPS alone not sufficient for accuracy and reliability requirements
- **In tunnels/underground:** Lack of visible satellites result in GPS unavailability
- **High precision applications:** Surveying, construction, and agriculture require cm-level accuracy GNSS alone can't provide

Solutions employed to augment GPS

- **Augment GNSS signals with error correction signals** to achieve up to 2-3cms accuracy
- **Deploy additional technologies outside GNSS**
 - **Assisted GPS** (triangulate location based on mobile base stations)
 - **Inertial measurement units (IMUs)**
 - **Radar/sensors/barometers**
 - **Wi-Fi**

Several complementary technologies augment GNSS

	Description	Sample application
Assisted GPS	<ul style="list-style-type: none"> ▪ Leverage cellular towers to effectively triangulate device location 	<ul style="list-style-type: none"> ▪ iPhone triangulate location based on cell towers
IMU/Integrated navigation systems	<ul style="list-style-type: none"> ▪ Employ a mix of motion sensors (gyroscopes) to effectively calculate position based on a starting reference point and motion measures ▪ Specific to commercial airplanes. Inertial navigation system employs information from motion sensors, GPS, barometers and radar to determine position 	<ul style="list-style-type: none"> ▪ Airplanes deploy a mix of sensors and GPS to determine position
Wi-Fi (indoor)	<ul style="list-style-type: none"> ▪ Determine relative position to stationary Wi-Fi routers placed indoors 	<ul style="list-style-type: none"> ▪ Cellular ▪ Indoor navigation devices
Sensor (radar/ etc.)	<ul style="list-style-type: none"> ▪ Set of sensors employed that help devices navigate through immediate location/path <ul style="list-style-type: none"> – e.g., radars/cameras/infrared 	<ul style="list-style-type: none"> ▪ ADAS-enabled cars ▪ Marine systems