EUROPEAN CHAMBER OF COMMERCE TAIPEI
台北市歐洲商務協會

Galileo Masters 2012
Kick-off

Industrial Cooperation between EU and Taiwan on GNSS

31st March 2012

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GNSS.asia Expert for Taiwan
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Introduction

1. Status on Galileo and GNSS Global Market
2. Co-opetition opportunities on the Road segment
3. IC architecture for LBS chips: new paths for cooperation

As of January 2012, the ECCT participates to the EU funded project GNSS.asia promoting EU-Taiwan industrial cooperation on satellite navigation applications.

The GNSS.asia project is funded by the European Commission under the 7th framework programme grant agreement N° 287244.

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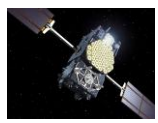
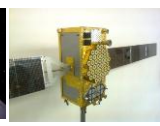
1. Galileo Status Summary

Galileo is progressing from the development phase to the deployment phase

- GIOVE-A, GIOVE-B missions still ongoing
- **In-Orbit Validation phase:** First operational IOV satellites (x2) launched on 20th October, 2011. Two other IOV satellites plus ground segment scheduled for 2012.

- Galileo early services by 2014
- International coordination is critical
  - to ensure compatibility with other GNSS
  - to achieve interoperability as desired

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Galileo Services

Early OS, SAR, PRS services will be provided by 2014/2016

Open Service	Free to air, mass market, simple positioning	
Public Regulated Service	Encrypted, robust, continuous availability	
Search and Rescue Service	Near real-time, precise, return link	
Commercial Service	Encrypted, high accuracy, added-value service	

A decision to re-profile SoL has been taken

Safety of Life Service	Adds integrity to open service	

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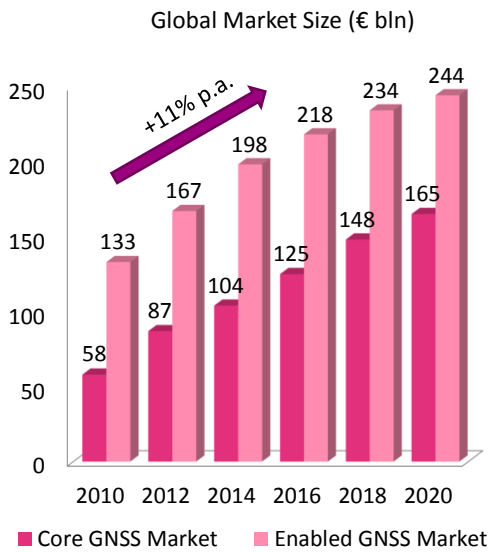
Global GNSS Market

- Total enabled GNSS market: **€244 bln** (2020)
- Core global GNSS market: **€165 bln** (2020)

- Core GNSS market, accounting only parts of the retail price that are directly attributable to GNSS (e.g. chipset, maps, navigation software) in LBS sector
- Enabled GNSS market, accounting e.g. full price of GNSS mobile phones in LBS sector



Sources: GSA

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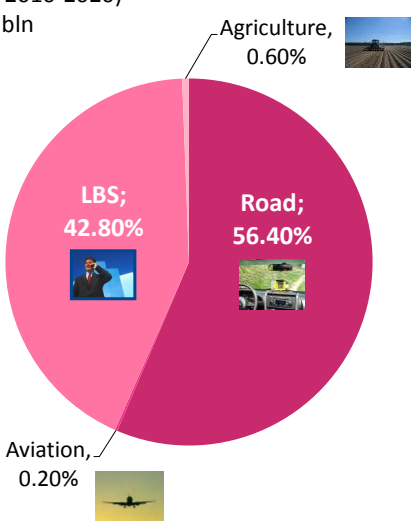
Global core GNSS market by segment

(cumulated revenues 2010-2020)
Total: €1260 bln

LBS and Road will be the market sectors with the highest revenue generation.



- Road: including PND and in-vehicle systems
- LBS (Location Based Services): including GNSS-enabled mobile phones and services
- Agriculture: including low and high technology
- Aviation: including GNSS devices for commercial and general aviation

Sources: GSA

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2. Road: more than navigation

Car navigation
Car navigation is currently the main application of GNSS.

PND sales have enjoyed fast growth over the past years:
- 76% per year worldwide, 55% in the EU.
- Taiwan strong leadership on PND segment.

But:

• PNDs are not popular everywhere (more in EU than by US/Japanese consumers).

• PNDs are reaching a peak now (2012-2013)!

• Smartphone penetration and **mobile computing wave** (3rd wave of innovation in micro-electronics) are key drivers for changes!

Other applications:

• **Fleet management and logistics**
• **Road User Charging**
• **Emergency call**

The European "eCall" programme foresees that all new cars manufactured in the EU in 2014 will be equipped with an emergency call system.

15 EU Member States have signed the eCall Memorandum of Understanding in 2009.

"Today, 8th September 2011, the European Commission adopted a Recommendation addressing the EU Member States and asking them to call on the mobile network operators to set up their networks in a way that they correctly transmit automatic 112 emergency calls generated by cars (eCalls)." (EC Press release)

GNSS asia

Sources: GSA, European Commission

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Road forecasts & trends

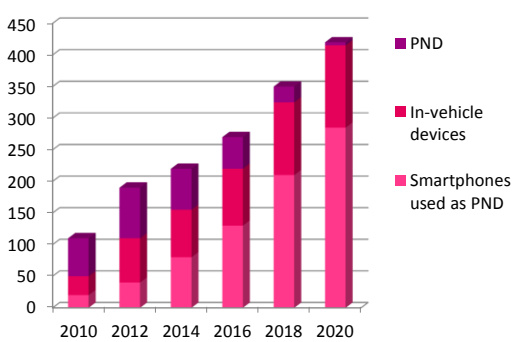
Prices for PND: -7% (CAGR)
Prices of in-vehicle systems: -6%

• Total GNSS road segment revenues (devices):
  • €74 bln in 2014
  • €87 bln in 2020

• **Services based on cooperative systems**
  • Advanced services for safety
  • Assistance to the driver
  • Active traffic management
  • New information and entertainment services

  ➢ Important additional source of growth!

Worldwide shipments (mln units) of installed base of GNSS devices in road sector



GNSS penetration in vehicles: 87% by 2020 (including smartphones, ww)

GNSS asia

Sources: GSA

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Chinese passenger car market

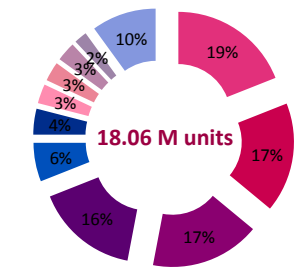
The Chinese market is becoming the largest consumer of vehicles recently.

- 18.06 million cars sold in 2010.
- Annual growth expected to be 12%-15% in the coming years.

Lots of car manufacturers are sharing this huge market

- Most of them have JVs with foreign companies to gain design capabilities
  - **SAIC with Volkswagon, GM; Dongfeng with Nissan, Peugeot; FAW with VW**
- Only several companies are purely local: they are expected to grow very fast
  - **BYD Auto, Chery, Geely…**

Market share of classic vehicle manufacturers in 2010 (in Munits)



- SAIC
- FAW
- Dongfeng
- Chana
- Shanghai - GM
- Beijing - Hyundai
- Dongfeng - Nissan
- BYD Auto
- Chery
- Geely
- Others (Guangqi, Beiqi, Yunnan…)

GNSS asia Courtesy of Yole Développement © 2011

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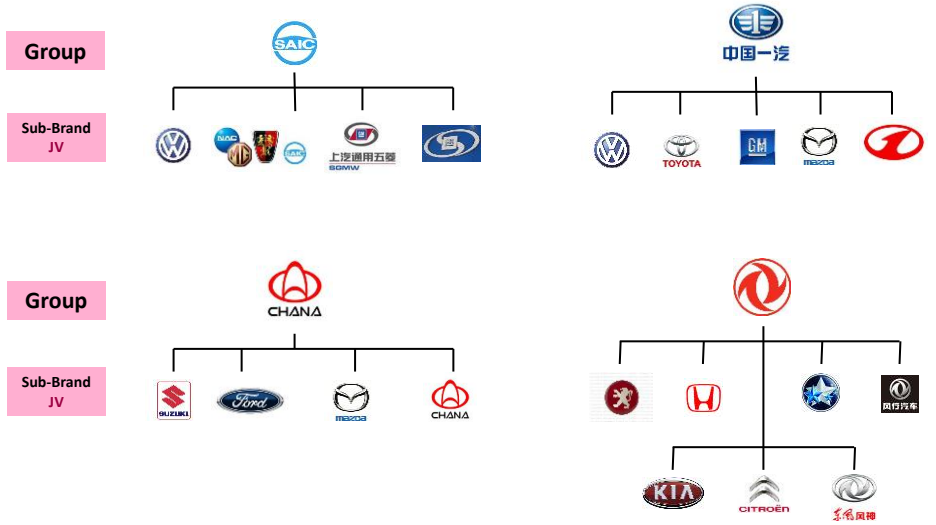
Chinese & Foreign Vehicle Players in China



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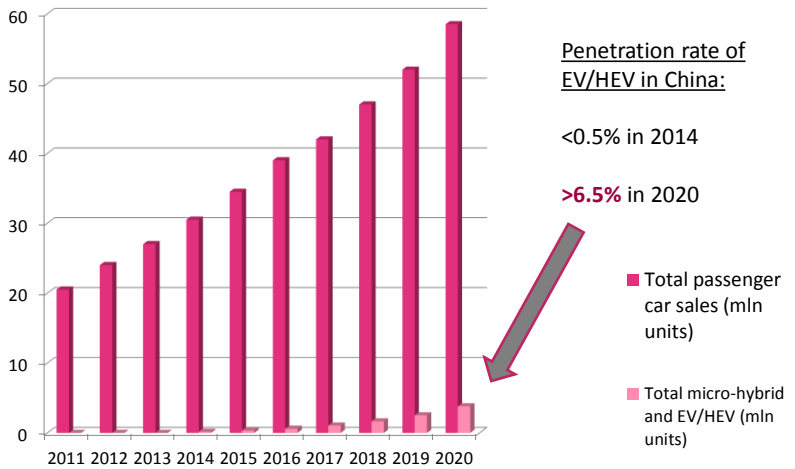
Annual Demand in China Forecast



Active industrial collaboration between Europe and Greater China on Power Electronics for electric vehicles and HEV (active/passive components) !

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Co-opetition opportunities

How European Companies can co-operate with Taiwan to be (co)competitive in growing market on Road market segment?

- Strong position of Taiwan in electronics and micro-electronics manufacturing segment.
- Integrated supply chain with Mainland China (electronics).
- Market knowledge and "go-to-market" expertise into Greater China.
- Taiwan positioning in the Road/Car Industry (beside "LuxGen"): EV/HEV? Power µElectronics? Telematics…

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3. Mobile LBS are taking off

More and more mobile phones with GNSS inside
Increasing consumer and developer awareness
Application stores provide a viable business model

android App Store ovi

LBS Value Chain

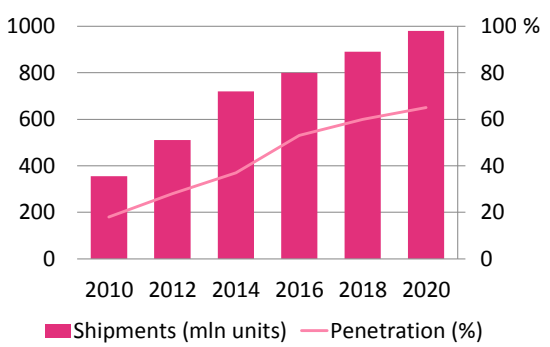
Improvement in navigation performance
Leading smartphones display a host of technologies to improve position performance:
- Highly sensitive GNSS chipset
- Wi-Fi, cellular and hybrid positioning as back-up
- Motion sensors and gyroscopes for tilt
- Magnetic compass

GNSS penetration in mobile phones

Increasing attractiveness:
New applications and services such as vulnerable people tracking, mobile commerce and location-based games.

Increasing affordability:
Price erosion and reduced power consumption of GNSS chipsets (integration & miniaturization) .

GNSS-enabled mobile phones (worldwide)



Almost 1 billion GNSS-enabled mobile phones shipped every year in 2020
By 2020 the penetration of GNSS-enabled mobile phones will have reached 65%.

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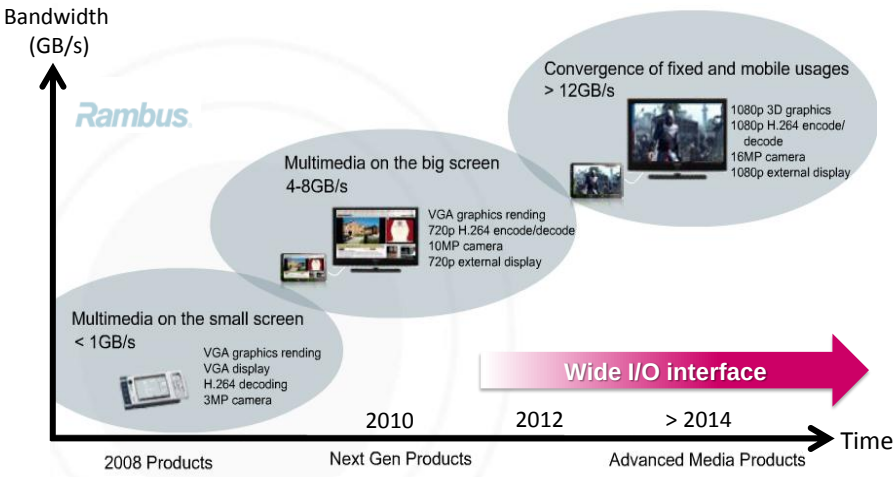
Mobility: stringent demand on Logic to Memory bandwidth



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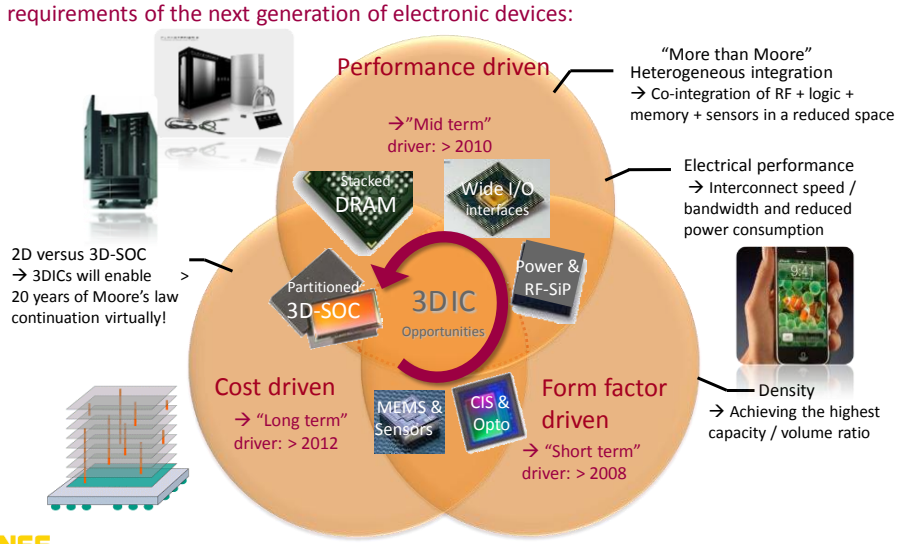
3D IC Market drivers

→ The integration of 3D technologies will enable performance, form factor and cost requirements of the next generation of electronic devices:



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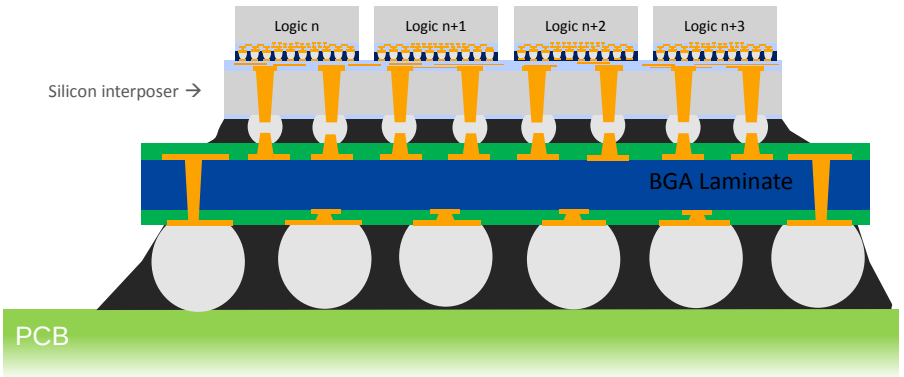
2.5 interposer solution

- '4 slices' instead of one die 3D-SOC re-partionned logic design
  - Increase back of CMOS manufacturing yield (because of smaller die size)
  - High density wiring at the surface of the 4 layer copper damascene silicon interposer wafer
    → breakthrough in cost versus power consumption versus performance



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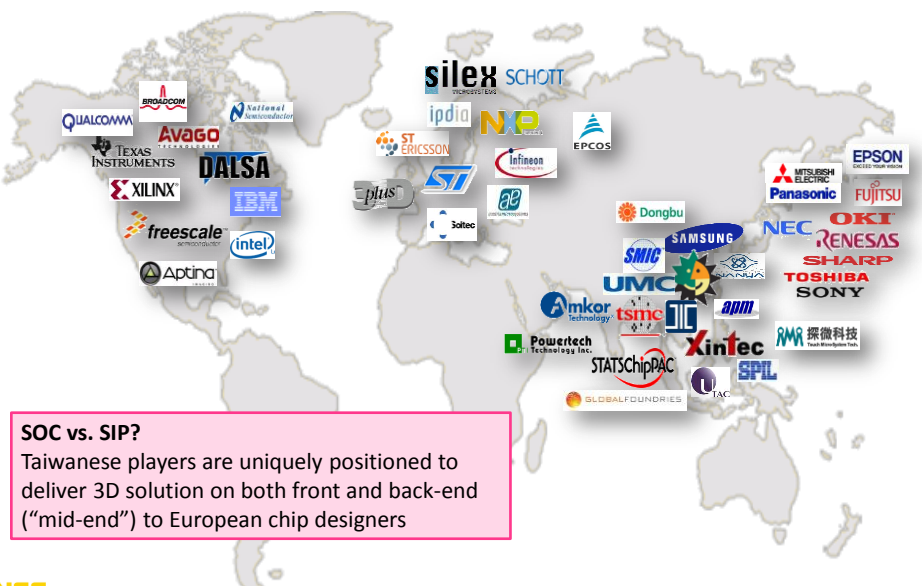
Geographic mapping of 3D IC Players



SOC vs. SIP?
Taiwanese players are uniquely positioned to deliver 3D solution on both front and back-end ("mid-end") to European chip designers

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3D integration has optimistic perspectives!

- Remaining challenges for 3DIC integration are not bottlenecks and should rather be considered as “opportunities” as these innovations will create a new market space!

“SOC world” **3DIC market space!**

“You cannot resist an idea who’s time has come. So you have a choice, you can be a believer or you can be a non believer… So what do you say, do you believe?” Mr. Ho-Ming Tong from ASE *(Taiwan)*

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Conclusion

- European GNSS programmes will make possible a whole new range of ‘reliability-critical' services, applications and **business opportunities between Europe and Taiwan.**
- The worldwide GNSS market is growing fast and revenues are expected to increase at a **11% CAGR** over the next decade.
- **Road market segment is the leading segment** as of today and for the coming years (2010-2020 perspective).
- GNSS-enabled mobile phone and services (LBS) will be another market sector with the **highest revenue generation**.
- **Co-opetition** between Taiwan and European manufacturers on road market segment must be considered to address growing markets
- New technologies developped and industrialized by Taiwanese major players on advanced **3D packaging** and **‘System-in-Package’ SIP** open new doors of integration and multiple GNSS compatibility to European chip makers.
- Are there any ‘Taiwanese Models’ to leverage?

LUXGEN htc smart mobility

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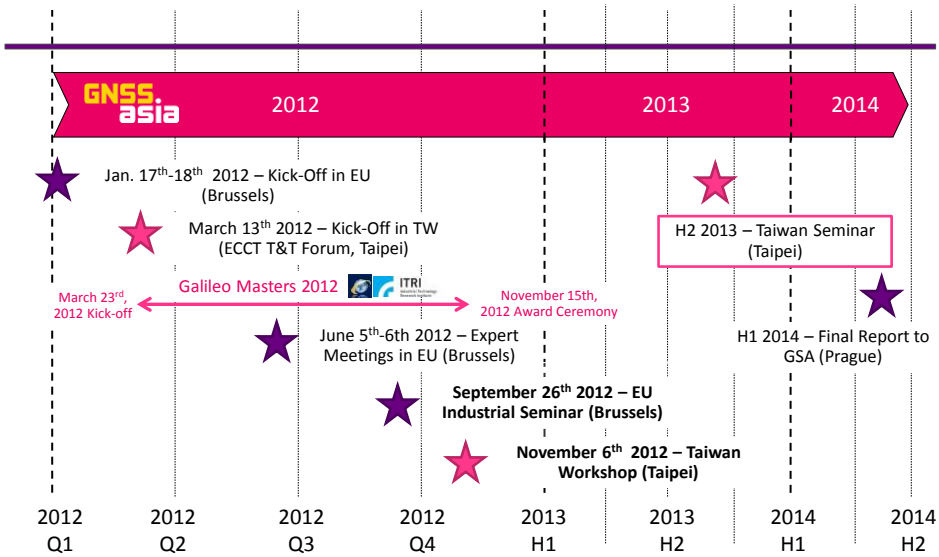
GNSS.asia Taiwan Roadmap



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謝謝 Thank You