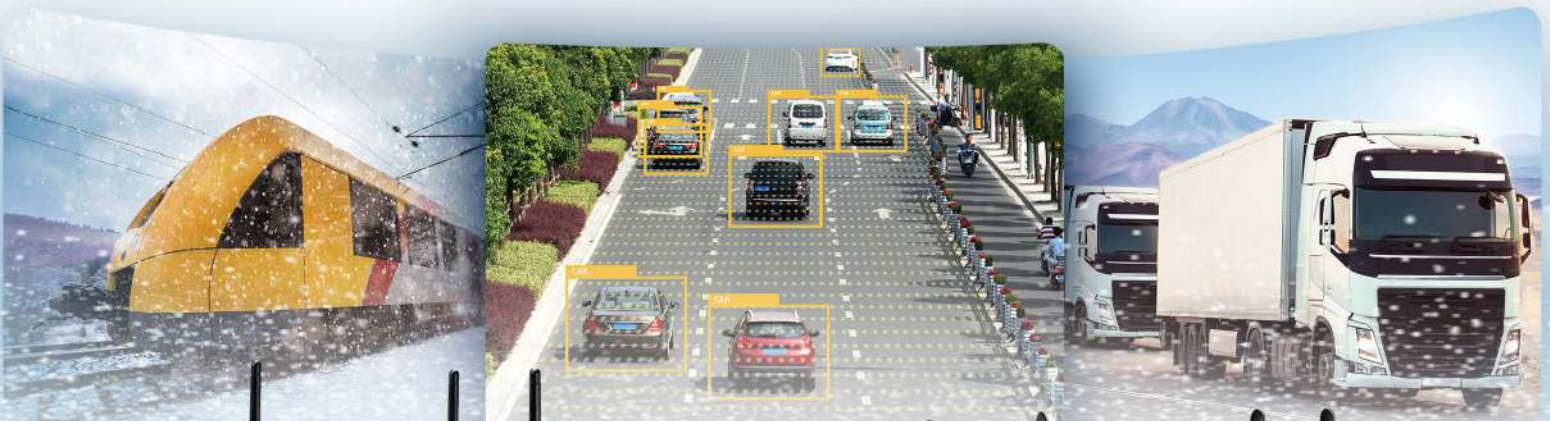


# Intelligent Transportation Systems

## Certified Designs for In-Vehicle, Roadside Surveillance, and Rolling Stock Applications

- Value Proposition
- Product Portfolio
- Case Study
- Selection Guide



Extension Layers



EMark/EN50155 Certification



Diverse Communication



Wide-Temperature Operating Range



Anti-Vibration / Anti-Shock



Edge AI Module Compatibility

# ADVANTECH

Enabling an Intelligent Planet

[www.advantech.com](http://www.advantech.com)

# Intelligent Transportation Systems

Advantech provides in-vehicle, rolling stock roadside surveillance fanless systems with unique designs for applications in the transportation industry. These products feature in-vehicle/rolling stock certifications (EMark/EN50155), high extension capability for communication interfaces, and rugged, wide operating temperature designs.

With flexible hardware design capability, we efficiently meet customers' function and time-to-market requirements, and enable abundant applications in transportation field. Together with the IoT device operation management software WISE-DeviceOn, our intelligent transportation systems make equipment management easier for transportation applications.

WISE-DeviceOn



IoT Solutions Alliance Premier



## Certified Designs

- Railway EN50155, EN50121-3-2 certifications
- Vehicle EMark, ISO 7637-2 certifications
- Anti-vibration, shock proof, wide temperature operation



## High Flexibility for Various Applications

- Stackable designs to quickly fit in different usage scenarios
- Diverse options for communications, I/O and storage extension



## Scalable Product Portfolio

- Diverse platform offerings from power saving to high performance
- DTOS service in extension kit





# ARK-V Series

## In-Vehicle Computing Systems

- E-Mark, ISO 7637-2, IEC 60721-3-5 certified
- Compatible with edge AI modules VEGA
- Dual SIM slots support diverse communication
- Built-in APIs for vehicle ignition and PoE ports management



### Recommended Applications

- Driver behavior detection
- Vehicle health diagnostics
- Fleet management
- Onboard surveillance
- Bus infotainment
- Passenger information system



#### ARK-2121V

- Intel Atom E3845 / E3825
- 12/24 VDC with power ignition management
- -30 ~ 60° C (E3845) / 30 ~ 70° C (E3825) operating temp.



#### ARK-2151V

- Intel Core i5-4300U / Celeron 2980U
- 12/24 VDC with power ignition management
- -20 ~ 60° C operating temp.



#### ARK-2250V

- Intel Core i7-6822EQ/i5-6442EQ
- 12/24 VDC with power ignition management
- -20~70°C operating temp.

# ARK-S Series

## Roadside Surveillance Systems

- 12~24VDC with 1.5KV isolation
- Shock and vibration MIL-STD-810G, Method 514 tested
- Built-in WISE-DeviceOn APIs
- Compatible with edge AI modules VEGA



### Recommended Applications

- Roadside surveillance
- Vehicle & pedestrian track record
- License plate recognition
- Traffic flow monitoring



#### ARK-2121S

- Intel Atom E3845 with 4 x PoE
- 9 ~ 36 VDC with 1.5KV isolation
- -30~60°C operating temp.



#### ARK-2151S

- Intel Core i5 4300U with 4 x PoE
- 9 ~ 36 VDC with 1.5KV isolation
- 20~60°C operating temp.



#### ARK-2250S

- Intel Core i7-6822EQ/i5-6442EQ
- 12~24VDC with 1.5KV isolation
- -20~70°C operating temp.
- NEMA TS2 environmental certified

# ARK-R Series

## Rugged Rolling Stock Systems

- EN50155, EN50121-3-2, EN50121-4, IEC61373 certified
- Compatible with edge AI modules VEGA
- Lockable and rugged I/O designs
- Optional extension layers for PoE, COM/DIO, storage



### Recommended Applications

- Safety monitoring
- BYOD infotainment
- Alarm system
- Cabin environment monitoring
- Traveler information system



#### ARK-2231R

- Intel Atom E3845
- -40 ~ 70 °C EN50155 TX
- 24VDC EN50155 S2/C1 compliant, 48/ 72/ 110VDC options



#### ARK-2250R

- Intel Core i7-6822EQ/i5-6442EQ
- -40 ~ 70 °C EN50155 TX
- 24VDC EN50155 S2/C1 compliant, 48/ 72/ 110VDC options

# AMK Series

## Stackable Extension Layers

- Compatible with ARK-2231R and ARK-2250 series
- -40~70°C EN50155 TX certified



#### AMK-R100E

- 8x GbE PoE+ (X-coded)
- 1x anti-vibration 2.5" drive bay
- -40~70°C EN50155 TX



#### AMK-R101E

- 4x GbE PoE+ (X-coded)
- 1x anti-vibration 2.5" drive bay
- -40~70°C EN50155 TX



#### AMK-R104E

- 8x 10/100M PoE+ (D-coded)
- 1x anti-vibration 2.5" drive bay
- -40~70°C EN50155 TX



#### AMK-R105E

- 4x 10/100M PoE+ (D-coded)
- 1x anti-vibration 2.5" drive bay
- -40~70°C EN50155 TX



## AI-Based Driver Safety System



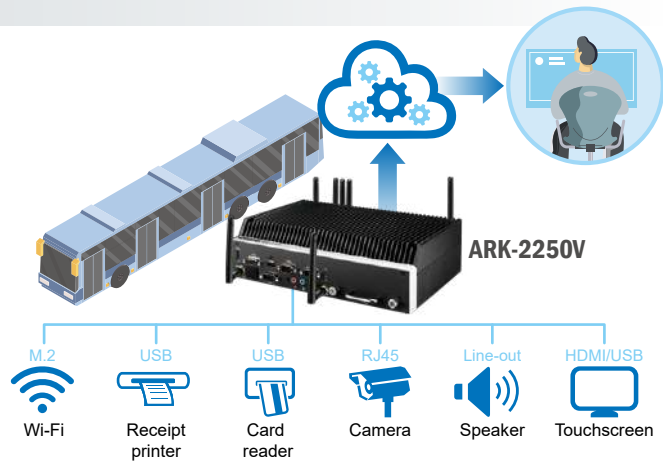
### Application Requirement

Driver behavior affects traffic safety significantly. Nowadays AI can effectively track and monitor driver behavior and vehicle status to avoid road accidents. The system for AI-based driver safety detection not only requires ruggedized design and multiple I/O to fit in-vehicle environments, it also requires top-level computing and graphics performance, and wireless connectivity to integrate the AI solution.

### Winning Factors

#### ARK-2250V

- E-Mark, ISO 7637-2, IEC 60721-3-5 certified
- High performance powered by Intel Core i7-6822EQ
- Ruggedized design with -20~70°C operating temp.
- Peripheral integration services (Wi-Fi/4G/touchscreen)



## Passenger Information & Entertainment Systems



### Application Requirement

Public transportation - trains, metros, coaches - is essential to modern economies. For service providers, this means passengers are constantly seeking to improve both the efficiency and quality of their travel experience. Our passenger information and entertainment systems provide uninterrupted wireless internet access, allowing customers to enjoy online content and location-based information along their journey.

### Winning Factors

#### ARK-2250R

- EN50155, EN50121, IEC61373 certified
- Up to 8ch x 1080p @30fps IP camera connection for video surveillance
- Supports dual LTE Cat6 300/50Mbps bandwidth
- Supports dual 3MIMO WiFi as hot spot point
- Ultra wide operating temp. from -40~70°C



# Intelligent Transportation Systems

**NEW**



Application		Outdoor NVR			In-Vehicle
Model Name		ARK-2121S	ARK-2151S	ARK-2250S	ARK-2121V
Processor System	CPU	Intel Atom E3845	4th Gen Intel® Core i5 4300U	6th Gen Intel Core i5-6442EQ/i7-6822EQ	Intel Atom E3825/E3845
	Frequency	1.91 GHz	1.9 GHz	1.9GHz/2.0GHz	1.33 GHz / 1.91 GHz
	Core Number	4	2	4	2/4
	BIOS	AMI EFI 64 Mbit	AMI EFI 128 Mbit	AMI UEFI 128Mbit	AMI EFI 64 Mbit
	Chipset	SoC	SoC	QM170	SoC
Memory	Technology	DDR3L 1333 MHz	DDR3L 1600 MHz	DDR4 2133MHz	DDR3L 1066/1333 MHz
	Max. Capacity	8 GB	8 GB	32 GB	8 GB
	Socket	1 x 204-pin SO-DIMM	1 x 204-pin SO-DIMM	2 x 260-pin SODIMM	1 x 204-pin SODIMM
Display	VGA	1 (up to 1600 x 1200)	1 (up to 1920 x 1200)	-	1 (up to 1600 x 1200)
	DDI (HDMI/DVI/DisplayPort)	1 x lockable HDMI, up to 1080P	1 x lockable HDMI, up to 4K at 24 Hz	2 x lockable HDMI, up to 1080P	1 x lockable HDMI, up to 1080P
	Multiple Display	Dual	Dual	Dual	Dual
Expansion Interface	MiniPCIe / M.2	1 x Full-size Mini PCIe 1 x Full-size Mini PCIe 2 x Full-size Mini PCIe w/SIM holders	1 x Half-size Mini PCIe 1 x Full-size Mini PCIe 2 x Full-size Mini PCIe w/SIM holders	1 x M.2 (2230 E Key) 2 x Full-size Mini PCIe w/SIM holders	1 x Full-size Mini PCIe 1 x Full-size Mini PCIe 2 x Full-size Mini PCIe w/SIM holders
	SIM socket	2	2	2 (accessible)	2
Other	GPS	-	-	-	Supports GPS, GLONASS, GALILEO and OZSS signals
	G-Sensor	-	-	-	Optional
	PoE	4 x 10/100 Mbps PoE	4 x 10/100 Mbps PoE	Optional extended modules 4/8 GbE PoE (M12 D/X-coded)	4 x 10/100 Mbps PoE (E3845)
	CANBus	-	-	optional	optional
Ethernet	Controller	GbE 1: Intel I210-IT GbE 2: Intel I210-IT	GbE 1: Intel I218 GbE 2: Intel I210-IT	GbE 1: Intel i219 GbE 2: Intel i210	GbE 1: Intel I210-IT GbE 2: Intel I210-IT
Audio	Audio Interface	HD Audio	HD Audio	HD Audio	HD Audio
	Connector	3 (Line-in, Line-out, Mic-in)	3 (Line-in, Line-out, Mic-in)	3 (Line-in, Line-out, Mic-in)	3 (Line-in, Line-out, Mic-in)
	3G Voice	-	-	-	1 x Line-out, 1 x Mic-in
WatchDog Timer	Yes	Yes	Yes	Yes	
Storage	SATA	1 x 2.5" removable drive bay	1 x 2.5" removable drive bay	1 x 2.5" removable drive bay Optional 2nd 2.5" drive bay in extended modules	1 x 2.5" removable drive bay
	mSATA	1 x Full-size mSATA	1 x Full-size mSATA	1 x Full-size mSATA	1 x Full-size mSATA
I/O	USB 3.0	1	2	3	1
	USB 2.0	3	2	-	3
	GPIO	6 x DI & 2 x DO with isolation	6 x DI & 2 x DO with isolation	4x DI & 4x DO with isolation	6 x DI & 2 x DO with isolation
	COM Port	2 x (RS-232/422/485)	2 x (RS-232/422/485)	3 x RS-232/422/485	2 x isolated RS-232/422/485 2 x RS-232/422/485 (E3825) 2 x RS-232/422/485 (E3845)
	LAN	2 x RJ45	2 x RJ45	2 x RJ45	2 x RJ45
Power	Power Supply Voltage	9 ~ 36 V <sub>dc</sub> w/ isolation	9 ~ 36 V <sub>dc</sub> w/ isolation	12 ~ 24 V <sub>dc</sub> w/ isolation	9 ~ 36 V <sub>dc</sub> w/power ignition management
	Connector	3-pin Phoenix	3-pin Phoenix	5-pin Phoenix	3-pin Phoenix
	Power Adaptor	AC to DC, 19 V <sub>dc</sub> , 120W	AC to DC, 19 V <sub>dc</sub> , 120W	AC to DC, 24Vdc, 150W	AC to DC, 19 V <sub>dc</sub> , 120W
	Regulation	-	-	-	ISO 7637-2 lev.4
Environment	Operating Temperature (air flow 0.7 m/sec)	-30 ~ 60 °C	-20 ~ 60 °C	-20 ~ 70 °C	-30 ~ 70 °C (E3825) -30 ~ 60 °C (E3845)
	Vibration Resistance	IEC 60068-2-64	IEC 60068-2-64	MIL-STD 810G, Method 514.6	IEC 60721-3-5 Class 5M3
	Shock Protection	IEC 60068-2-27	IEC 60068-2-27	MIL-STD 810G, Method 514.6	IEC 60721-3-5 Class 5M3
Physical Characteristics	Dimensions (W x H x D)	264.5 x 69.2 x 133.0 mm	264.5 x 75.1 x 133.0 mm	260 x 73 x 160.2 mm 260 x 99.6 x 160.2 mm with 2nd stack	264.5 x 69.2 x 133.0 mm
Operating System	Microsoft Windows	Yes (Win7, 10)	Yes (Win7, 10)	Yes (Win7, 10)	Yes (Win7, 10)
	Linux	Yes (by Project)	Yes (by Project)	Yes (by Project)	Yes (by Project)
APIs	WISE-PaaS/DeviceOn	Yes	Yes	Yes	Yes
Certification	EMC	CE/FCC Class A, CCC, BSMI	CE/FCC Class A, CCC, BSMI	CE/FCC Class B, CCC, BSMI	CE/FCC Class A, CCC, BSMI
	Safety Certifications	CB, UL, CCC, BSMI	CB, UL, CCC, BSMI	CB, UL, CCC, BSMI, NEMA TS2	UL, CCC, BSMI, CB, E-Mark

Note: "-" : means Not Applicable (N/A)



**NEW**

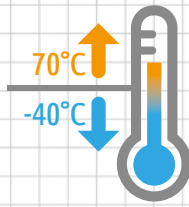


**NEW**



In-Vehicle		Rolling Stock	
ARK-2151V	ARK-2250V	ARK-2231R	ARK-2250R
4th Gen Intel Celeron 2980U/ Core i5-4300U	6th Gen Intel Core i5-6442EQ/i7-6822EQ	Intel Atom E3845	6th Gen Intel Core i5-6442EQ/i7-6822EQ
1.6 GHz / 1.9 GHz	1.9GHz/2.0GHz	1.91GHz	1.9GHz/2.0GHz
2	4	4	4
AMI EFI 128 Mbit	AMI UEFI 128 Mbit	AMI EFI 64-bit	AMI UEFI 128 Mbit
SoC	QM170	SoC	QM170
DDR3L 1333/1600 MHz	DDR4 2133MHz	DDR3L 1333	DDR4 2133MHz
8 GB	32G	8G	32G
1 x 204-pin SODIMM	2 x 260-pin SODIMM	1 x 204-pin SODIMM	2 x 260-pin SODIMM
1 (up to 1920 x 1200)	1 (up to 1920 x 1200)	1 (up to 2560 x 1600)	-
1 x lockable HDMI, up to 4K at 24 Hz	1 x lockable HDMI, up to 1080P	1 x lockable HDMI, up to 1080P	2 x lockable HDMI, up to 1080P
Dual	Dual	Dual	Dual
1 x Half-size Mini PCIe 1 x Full-size Mini PCIe 2 x Full-size Mini PCIe w/SIM holders	1x M.2 (2230 E Key) 2 x Full-size Mini PCIe w/SIM holders	1 x Full-size Mini PCIe 1 x Full-size Mini PCIe 1 x Full-size Mini PCIe w/SIM holder	1x M.2 (2230 E Key) 2 x Full-size Mini PCIe w/SIM holders
2	2 (accessible)	1 (accessible)	2 (accessible)
Support GPS, GLONASS, GALILEO and OZSS signals	Support GPS, GLONASS, GALILEO, BeiDou and OZSS signals	Support GPS, GLONASS, GALILEO, BeiDou and OZSS signals	Support GPS, GLONASS, GALILEO, BeiDou and OZSS signals
Optional	Optional	Optional	Optional
4 x 10/100 Mbps PoE (4300U)	Optional extended modules 4/8 GbE PoE (M12 D/X-coded)	Optional extended modules 4/8 GbE PoE (M12 D/X-coded)	Optional extended modules 4/8 GbE PoE (M12 D/X-coded)
optional	optional	optional	optional
GbE 1: Intel i218 GbE 2: Intel i210-IT	GbE 1: Intel i219 GbE 2: Intel i210	GbE 1: Intel i210-IT GbE 2: Intel i210-IT	GbE 1: Intel i219 GbE 2: Intel i210
HD Audio	HD Audio	HD Audio	HD Audio
3 (Line-in, Line-out, Mic-in)	3 (Line-in, Line-out, Mic-in)	DB9 (Line-in, Line-out, Mic-in)	DB9 (Line-in, Line-out, Mic-in)
1 x Line-out, 1 x Mic-in	-	-	-
Yes	Yes	Yes	Yes
1 x 2.5" removable drive bay	1 x 2.5" removable drive bay Optional 2nd 2.5" drive bay in extended modules	1 x 2.5" removable drive bay Optional 2nd 2.5" drive bay in extended modules	1 x 2.5" removable drive bay Optional 2nd 2.5" drive bay in extended modules
1 x Full-size mSATA	1 x Full-size mSATA	1 x Full-size mSATA	1 x Full-size mSATA
2	3	1 (Water-proof)	1 (Type A female)
2	-	2 (M12 A-Coded)	2 (M12 A-Coded)
6 x DI & 2 x DO with isolation	4 x DI & 4 x DO with isolation	1 x 8bit DIO	1 x 8bit DIO
2 x isolated RS-232/422/485 2 x RS-232/422/485 (2980U) 2 x RS-232/422/485 (4300U)	3 x RS-232/422/485	2 x RS-232/422/485	2 x RS-232/422/485
2 x RJ45	2 x RJ45	2 x M12 X-code	2 x M12 X-code
9 ~ 36 V <sub>DC</sub> w/power ignition management	12/24 V <sub>DC</sub> w/power ignition management	24 V <sub>DC</sub> (48 V <sub>DC</sub> , 72 V <sub>DC</sub> , 110 V <sub>DC</sub> optional)	24 V <sub>DC</sub> (48 V <sub>DC</sub> , 72 V <sub>DC</sub> , 110 V <sub>DC</sub> optional)
3-pin Phoenix	5-pin Phoenix	M12 A-coded	M12 A-coded
AC to DC, 19 V <sub>DC</sub> , 120W	AC to DC, 24Vdc, 150W	AC to DC, 24Vdc, 180W	AC to DC, 24Vdc, 180W
ISO 7637-2 lev.4	ISO 7637-2 Lev.4	EN50155 S2&C1	EN50155 S2&C1
-20 ~ 60 °C	-20 ~ 70 °C	-40 ~ 70 °C (EN50155 TX)	-40 ~ 70 °C (EN50155 TX)
IEC 60721-3-5 Class 5M3	IEC 60721-3-5 Class 5M3, MIL-STD 810G	IEC61373 Category1, Class B	IEC61373 Category1, Class B
IEC 60721-3-5 Class 5M3	IEC 60721-3-5 Class 5M3, MIL-STD 810G	IEC61373 Category1, Class B	IEC61373 Category1, Class B
264.5 x 75.1 x 133.0 mm	260 x 73 x 160.2mm 260 x 99.6 x 160.2mm with extension module	260 x 57 x 160.2mm 260 x 83.6 x 160.2mm with extension module	260 x 73 x 160.2mm 260 x 99.6 x 160.2mm with extension module
Yes (Win7, 10)	Yes (Win7, 10)	Yes (Win7, 10)	Yes (Win7, 10)
Yes (by Project)	Yes (by Project)	Yes (By project)	Yes (By project)
Yes	Yes	Yes	Yes
CE/FCC Class A, CCC, BSMI	CE/FCC Class B, CCC, BSMI	CE/FCC, CCC, BSMI, EN50121-3-2	CE/FCC, CCC, BSMI, EN50121-3-2, EN50121-4
UL, CCC, BSMI, CB, E-Mark	CB, UL, CCC, BSMI, E-Mark	UL, CCC, BSMI, CB, EN50155	UL, CCC, BSMI, CB, EN50155

# Certified Designs for Transportation Applications



## ARK-R Series

### Rolling Stock

- Lockable I/O
- Railway certification

## ARK-S Series

### Roadside Surveillance

- High-level graphics performance
- Anti-vibration and shock proof

## ARK-V Series

### In-Vehicle Computing

- Communications diversity
- Vehicle certification

## Regional Service & Customization Centers

**China** | Kunshan  
86-512-5777-5666

**Taiwan** | Taipei  
886-2-2792-7818

**Netherlands** | Eindhoven  
31-40-267-7000

**Poland** | Warsaw  
00800-2426-8080

**USA** | Milpitas, CA  
1-408-519-3898

## Worldwide Offices

### Asia Pacific

**Taiwan**  
Toll Free 0800-777-111  
Taipei & IoT Campus 886-2-2792-7818  
Taichung 886-4-2372-5058  
Kaohsiung 886-7-392-3600

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Shenzhen 86-755-8212-4222  
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Hong Kong 852-2720-5118

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Osaka 81-6-6267-1887  
Nagoya 81-0800-500-1055  
Nogata 81-949-22-2890

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**Singapore**  
Singapore 65-6442-1000

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Penang 60-4-537-9188

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Breda 31-76-523-3100

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Düsseldorf 49-2103-97-855-0

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**Czech Republic**  
Ústí nad Orlicí 420-465-524-421

**Ireland**  
Galway 353-91-792444

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Milpitas 1-408-519-3898  
Irvine 1-949-420-2500  
Ottawa 1-815-433-5100

**Brazil**  
Toll Free 0800-770-5355  
São Paulo 55-11-5592-5367

**Mexico**  
Toll Free 1-800-467-2415  
Mexico City 52-55-6275-2727

### Middle East and Africa

Israel 072-2410527  
Turkey 90-212-222-0422



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