



E3soho

Energy Efficiency in European Social Housing

E3SoHo ICT solution and future technological trends

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E3SoHo Final European Workshop

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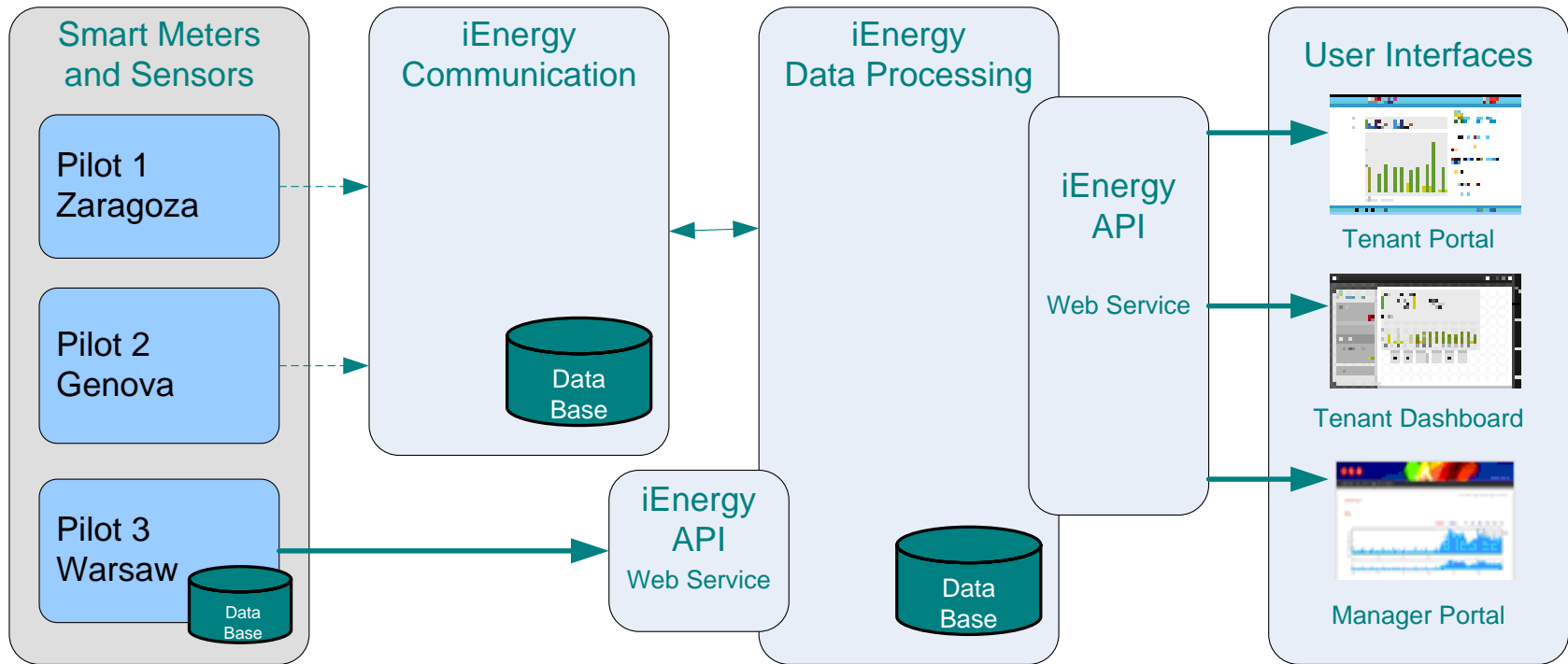
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Pilot sites

- **Location: Zaragoza**
- **Owner:** Zaragoza Vivienda
- **Year of construction:** 2002
- **No of floors:** Ground + 8
- **No of dwellings:** 43 (16 active)
- **No of users:** > 120 (46 active)
- **Heating:** 2 Central gas boilers
- **DHW:** Solar thermal + gas
- **Location: Warsaw**
- **Owner:** City of Warsaw
- **Year of construction:** 2007
- **No of floors:** Ground + 4
- **No of dwellings:** 48 (16 active in the project)
- **No of users:** 111 (34 active in the project)
- **Heating:** Central gas boiler
- **DHW:** Central gas boiler
- **Location: Genova**
- **Owner:** Comune di Genova / Private
- **Year of construction:** 1980-1990
- **No of dwellings:** 350 (30 active in the project)
- **No of users:** > 500 (> 60 active in the project)
- **Heating:** Central thermal power plant
- **DHW:** Gas



System Architecture



ICT solution main result (1)

The main result of the E3SoHo project is the development of an integrated ICT system composed of:

- a communication and data processing platform (iEnergy)
- a user interface for the tenants, allowing them to consult the historical consumptions, to view the consumptions in near real-time, to check comfort conditions and to be alerted of limit conditions (sDisplay)
- a user interface for building managers, allowing them to consult and compare (benchmark) aggregate consumptions and other parameters associated with common equipment and areas, and a flexible alarm management engine (BMTool)

ICT solution main result (2)



An additional solution only for tenants has been developed composed by :

- Local data base for Polish data collection and storage
- VAS – Visualization and Alert System an ICT Graphical User Interface (web application) providing energy consumption visualization, awareness and alerts for the tenants
- A integration mechanism to upload data to the central platform (SMD)
- Both sDisplay and VAS can be used in the 3 pilots

Summary of Measurements

Parameter	Zaragoza	Warsaw	Genova
Total electrical consumption	All dwellings	All dwellings	All dwellings
Partial electrical consumption (lighting and/or specific appliances)	Some dwellings	All dwellings	Some dwellings
Indoor temperature	All dwellings	All dwellings	All dwellings
Indoor humidity	All dwellings		All dwellings
Outdoor temperature	All floors		
Outdoor humidity	All floors		
Illumination		All dwellings	
Occupancy		All dwellings	
Window sensors	All dwellings	All dwellings	All dwellings
Domestic cold water	All dwellings		
Domestic hot water	All dwellings	All dwellings	
Heating hot water	All dwellings		
Gas	Pilot/Building		
Weather station	Pilot	Pilot	Pilot
Solar panel	Pilot/Building		

- Zaragoza Pilot
 - Cabled meters (Modbus)
Electricity
 - Wireless sensors (868 MHz)
Comfort (T+RH)
 - Wireless transmitters (868 MHz)
Hot Water, Heating, Gas, Cold Water
 - Weather station (Modbus)
 - SP enthalpy meter (M-bus to Modbus)
 - iHub data concentrators



- Warsaw Pilot
 - Wireless transmitters (868 MHz)
Electricity (total and partial circuits)
 - Cabled meters (M-bus)
Hot water, Heating
 - Wireless sensors (868 MHz, 433 MHz)
Comfort (T), Occupancy, Windows
 - Weather station (Modbus)
 - PLC data acquisition and PC (MySQL)
data concentrator



- Genova Pilot
 - Cabled meters (Modbus)
 - Electricity (total and partial circuits)
 - Wireless meters (ZigBee)
 - Electricity (partial circuits)
 - Wireless sensors (868 MHz)
 - Comfort (T+RH)
 - Weather station (Modbus)
 - iHub data concentrators

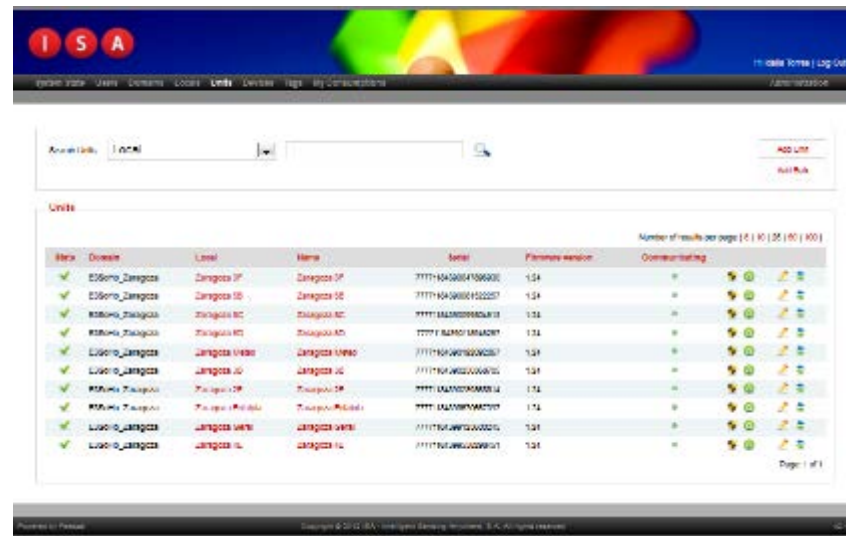


- Zaragoza Pilot
 - Common communication infrastructure (3G/GPRS router, LAN and WLAN)
- Genova Pilot
 - Communication infrastructure composed of a number of islands (3G/GPRS routers, LANs and WLANs)
- Warsaw Pilot
 - Communication infrastructure composed (ADSL router, LANs and WLANs)



Central Platform (1)

- Communication Module (CM)
 - Retrieve data from the field (communication protocols)
 - Stores raw data from sensors (temperature and meter readings)



The screenshot shows a web application interface with a navigation menu at the top (Home, Users, Devices, Units, Settings, Reports, My Communications) and a search bar. Below the search bar, there is a table titled 'Units' with the following columns: 'Check', 'Company', 'Local', 'Name', 'Serial', 'Firmware version', and 'Communication'. The table contains 10 rows of data, each representing a unit with a green checkmark in the 'Check' column and various details in the other columns. At the bottom of the table, it says 'Page 1 of 1'.

Check	Company	Local	Name	Serial	Firmware version	Communication
✓	E3soho_Daragosa	Daragosa 0P	Daragosa 0P	777776A52004106600	1.24	+
✓	E3soho_Daragosa	Daragosa 0B	Daragosa 0B	777776A52004102207	1.24	+
✓	E3soho_Daragosa	Daragosa 0C	Daragosa 0C	777776A52004106600	1.24	+
✓	E3soho_Daragosa	Daragosa 0D	Daragosa 0D	777776A52004106600	1.24	+
✓	E3soho_Daragosa	Daragosa 0E	Daragosa 0E	777776A52004106600	1.24	+
✓	E3soho_Daragosa	Daragosa 0F	Daragosa 0F	777776A52004106600	1.24	+
✓	E3soho_Daragosa	Daragosa 0G	Daragosa 0G	777776A52004106600	1.24	+
✓	E3soho_Daragosa	Daragosa 0H	Daragosa 0H	777776A52004106600	1.24	+
✓	E3soho_Daragosa	Daragosa 0I	Daragosa 0I	777776A52004106600	1.24	+
✓	E3soho_Daragosa	Daragosa 0J	Daragosa 0J	777776A52004106600	1.24	+

Central Platform (2)

- Data Processing Module (DPM)
 - Receive data from CM or Web Service
 - Process (unit conversion and tariff calculation) and aggregate (hourly and daily values) data
 - Offers unified interface for UI development



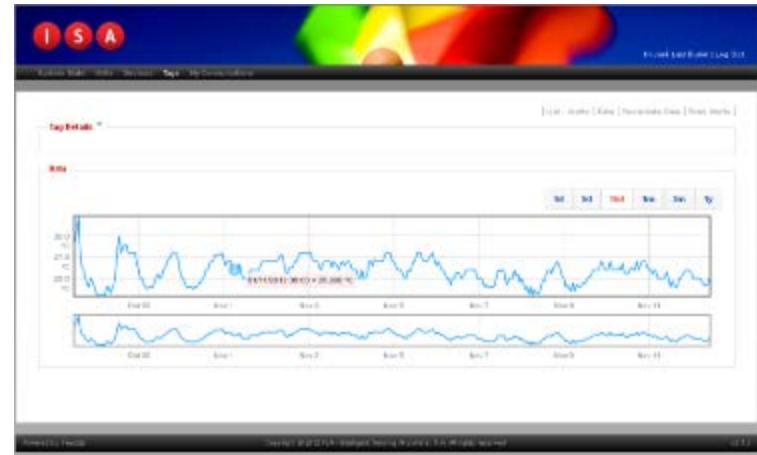
Tenant Applications

- Energy consumption information
 - Electricity (global and partial)
 - Hot/cold water
 - Heating
- Comfort data
 - Temperature/Humidity
- Historical data
- Monthly targets
- Advices
- Smart Alerts
- User interfaces: Android and web applications



Building Manager Tools

- Energy consumption information
 - Monitored dwellings
 - Total building consumptions
- Energy production
 - Solar thermal
- Comfort data
 - Common areas
 - Meteorological data
- Historical data
- Devices management



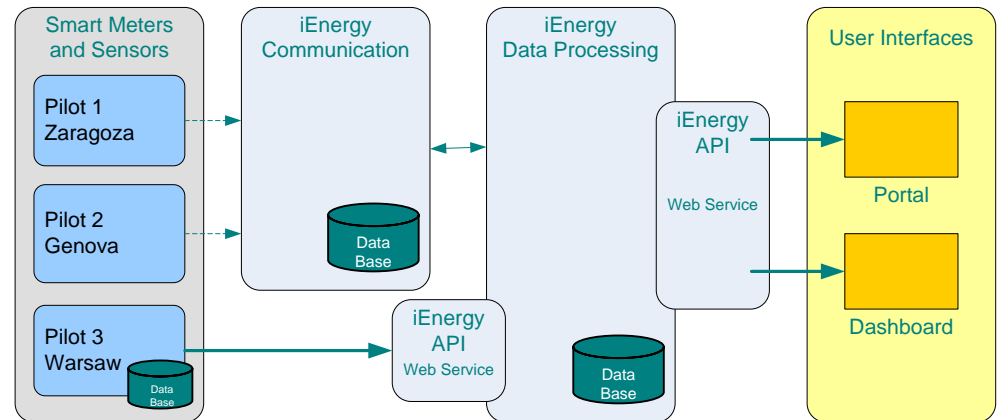
Screenshot of **iEnergy** web interface



Screenshot of **refined user interface**

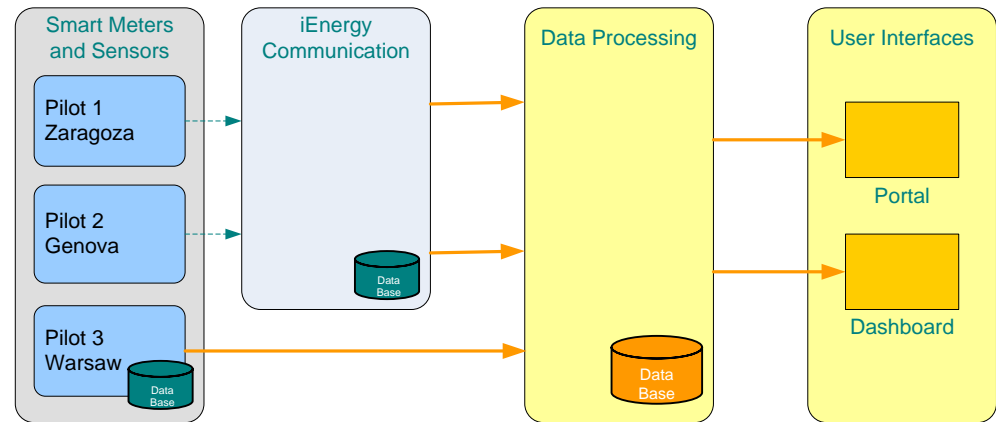
Interoperability (1)

- User Interfaces
 - sDispaly, VAS, and the BM Application
 - New UI can be developed
 - Open web service
- Data Integration
 - SABUR / SMD
 - Open web service
 - IEC 61968 under development



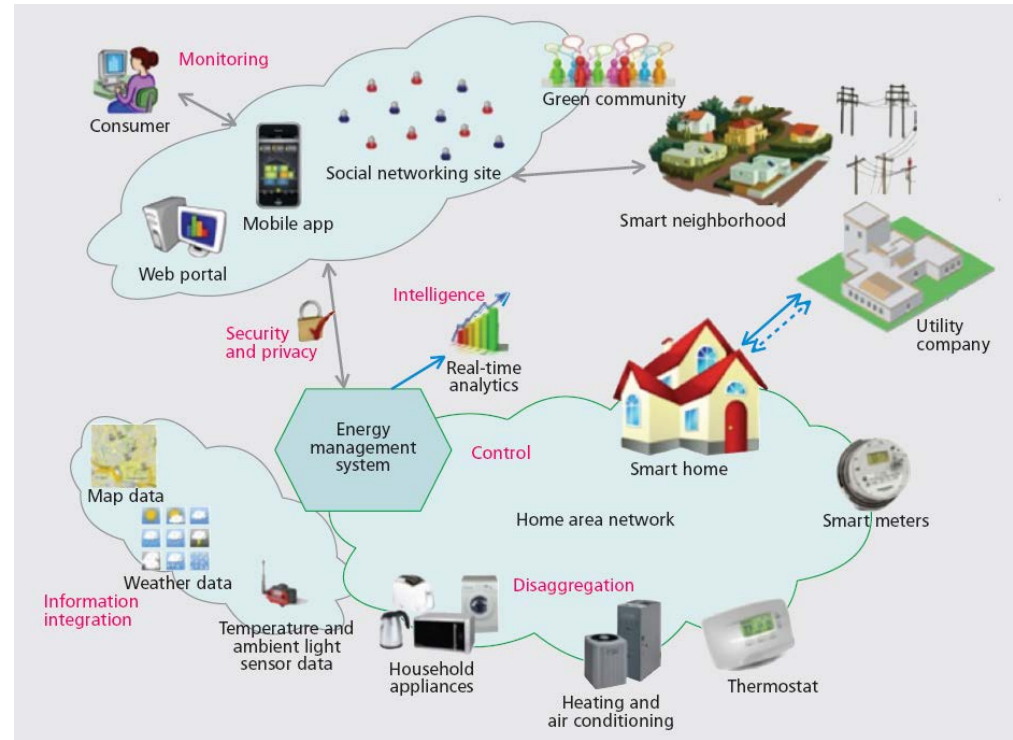
Interoperability (2)

- Device Communication
 - Data concentrator native protocols
 - Data concentrator + bridge
 - Existing BMS or BEMS
- Concentrator Communication
 - DLMS
 - OPC DA
 - DNP3
 - Schneider Electric EcoStruxure Web Services



Current Trends (EMS)

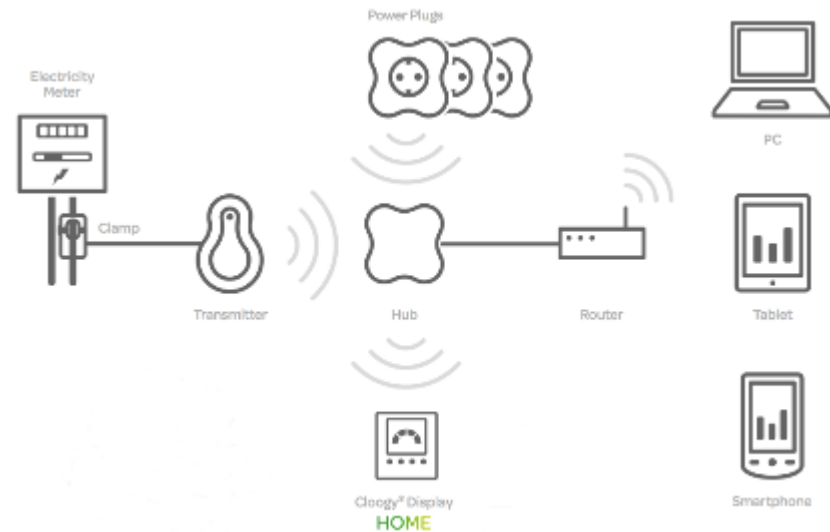
- Widespread broadband access
- Smart meters rollout (smart grid)
- Lower equipment and installation cost
- Advanced analytics
- Better feedback (actionable) information and control features



Source: Saima Aman, *EMS: State of the Art and Emerging Trends*

Current Trends (EMS)

- Monitoring
- Disaggregation
- Availability and Accessibility
- Information Integration
- Affordability
- Control
- Cyber-Security and Privacy
- Intelligence and Analytics



Dwelling installation

Current Trends (Cloogy)

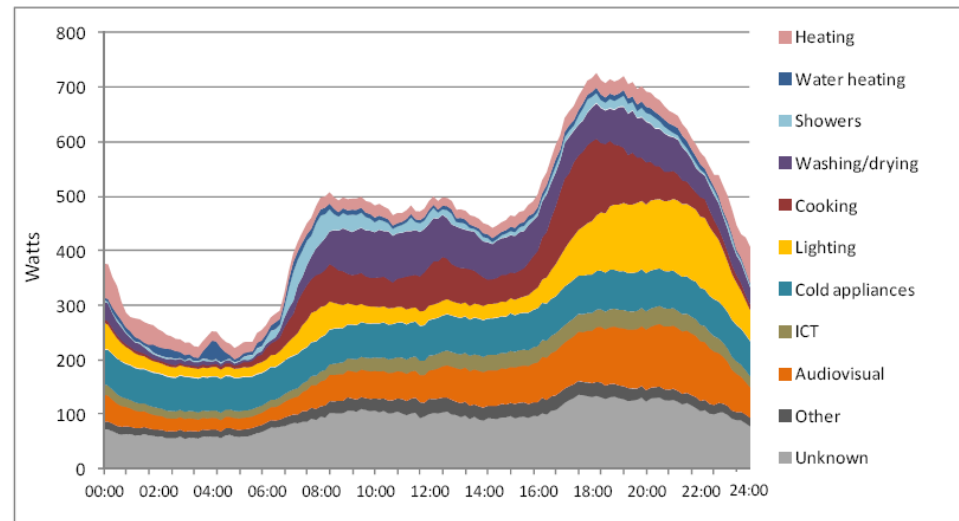
Cloogy is a household energy management solution that provides the user with monitoring, control and benchmarking features

- Hardware
 - Clamp + Transmitter
 - Power Plugs
 - iPoint
- Software
 - Web and mobile applications



Emerging Trends

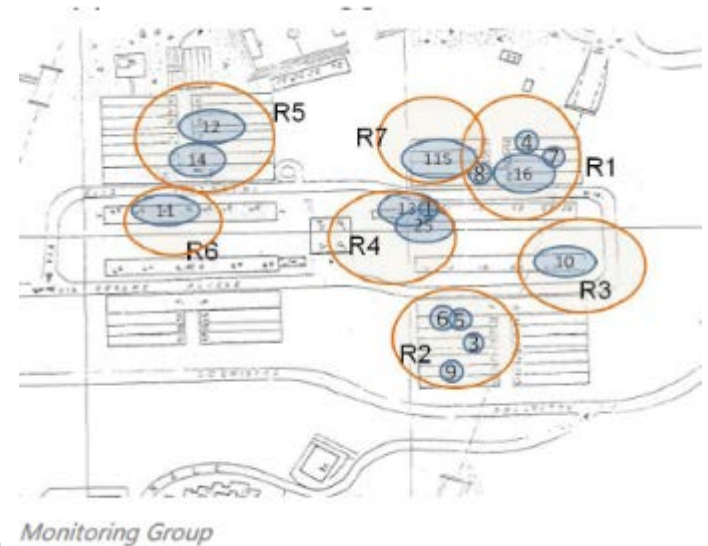
- Integration with Home Automation Systems
- Control of appliances
- Security surveillance
- Mobility and geo-location services
- Demand side energy management



Source: Jason Palmer, *Early Findings: Demand side management*

Conclusions (1)

- Successful implementation of an ICT solution integrating meters and sensors from different vendors
- Design of appropriate communication networks is a critical point for a fully operative working solution
- The solution should be the most interoperable as possible
- European standardization effort in need in order to reduce the number of standard protocol used in smart meters and in smart sensors



Conclusions (2)

- sDisplay native Android application improved its usability for the tenants
- User Interface must evolve radically to supply individual recommendations and gain tenant's engagement
- Local support in the pilot sites is necessary for maintenance purposes and for technical support for the customers
- The availability of a managers tool can reduce payback for all stakeholders



Thank you!

E3SoHo PROJECT information: **www.e3soho.eu**

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