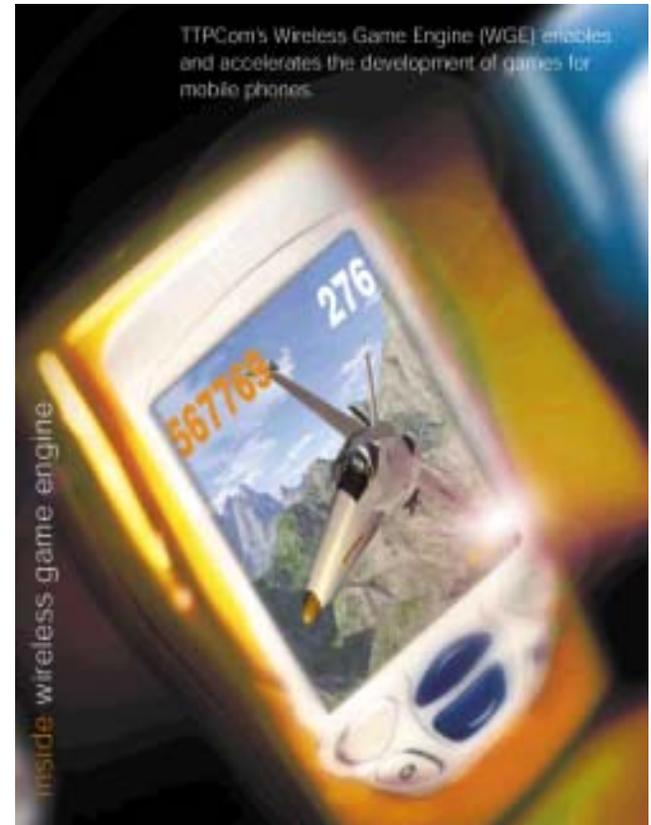


Wireless Game Engine

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Agenda

- Let's start by playing !
 - Traditional gaming technologies
 - 2 Games developed by TTPCom
- Mobile Gaming Market overview
- Technical challenges when developing games for mobile phones
- Wireless Game Engine - a real end to end solution
- Overview of the different games
- Summary and Questions

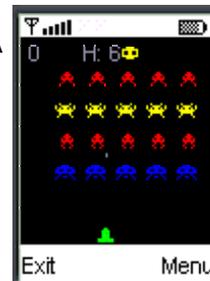
Let's play !

- SMS (text based)

- WAP

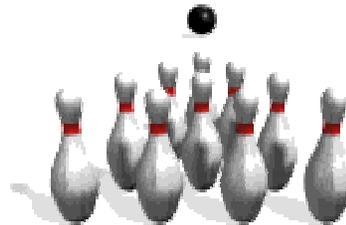


- Virtual Machines (VM) like JAVA



Goal

- February 2001: "Our goal is to offer in 2002 a handheld console equivalent gaming experience on mass market mobiles phones while using standard hardware"
- November 2001



Fillip in Savannah Adventures by TTPCom



- Features

- Branded character – Fillip crashlands on the Savannah and gets his airplane scattered all over the Savannah
- Start sequence
- Filip has to find airplane parts and assemble to escape the Savannah
- Various animals/bugs to avoid
- Different levels of difficulty
- High scores
- Trembler effect when colliding with objects
- Sound effects and melody playing

- DEMO!



Hurricane Space Fighters by TTPCom



- Main features

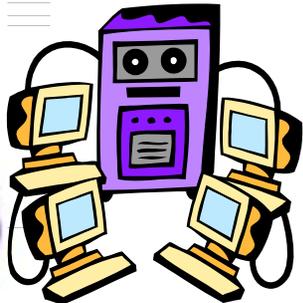
- You are on a mission to save the earth from the dark forces
- Different levels with varying scenary
- Highscore list, local and global
- Two different weapons: Lasergun and Missils
- Enemy ships attacking
- Different difficulties

- [DEMO!](#)

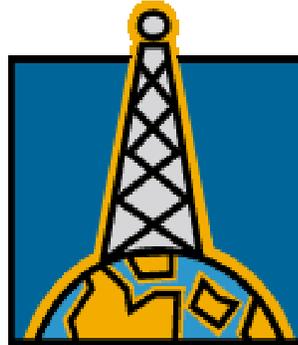


A real end-to-end solution

Dedicated Servers
Apps and games
TTPCom Portal



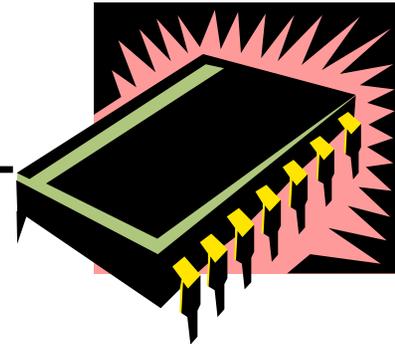
Content Provision
(Rankings, contests...)
Network Operators



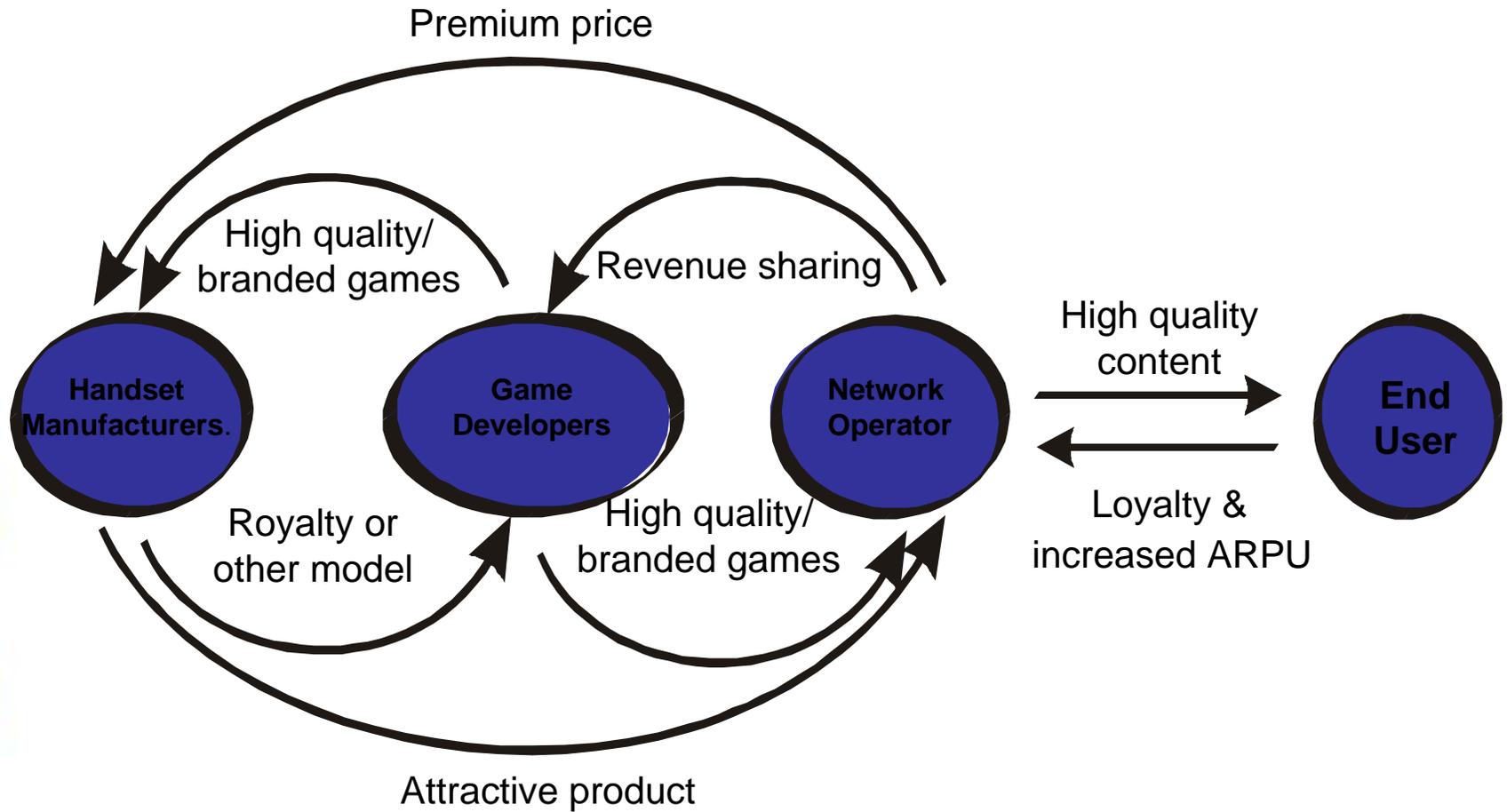
Optimised API
Games, MM apps
Handset



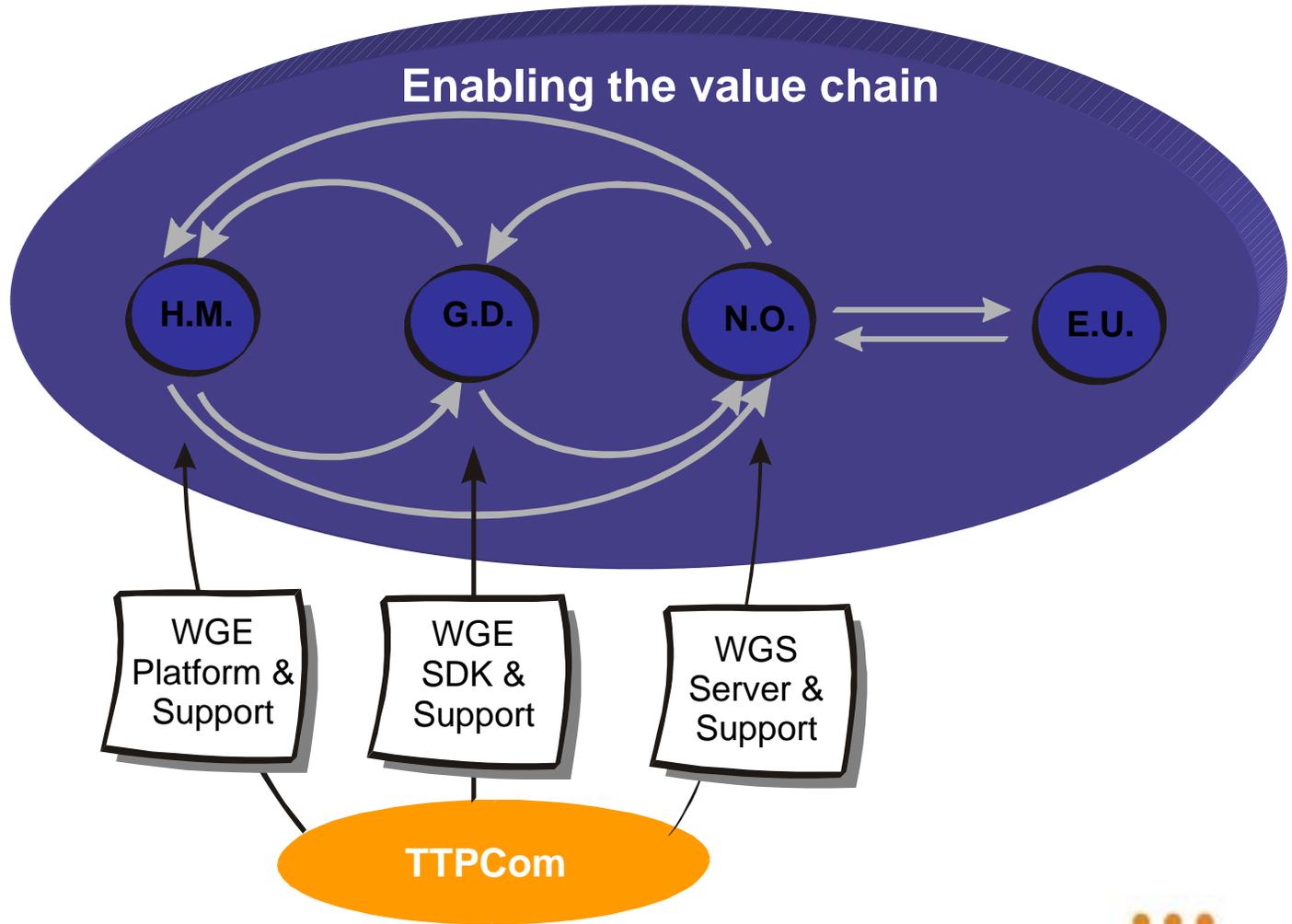
HW Acceleration
2D,3D functions
Chipset



The Business Concept



Enabling the business concept



Technical challenges / solutions

- Restricted Environment
 - Storage Memory
 - Runtime Memory
 - Display performances
 - Closed environment
- Choice of the programming language
 - Java ?
 - C vs C++
- Choice of Platform
 - TTPCom SW, Brew, Epoc, Merlin, PalmOs, PocketPC, Stinger...

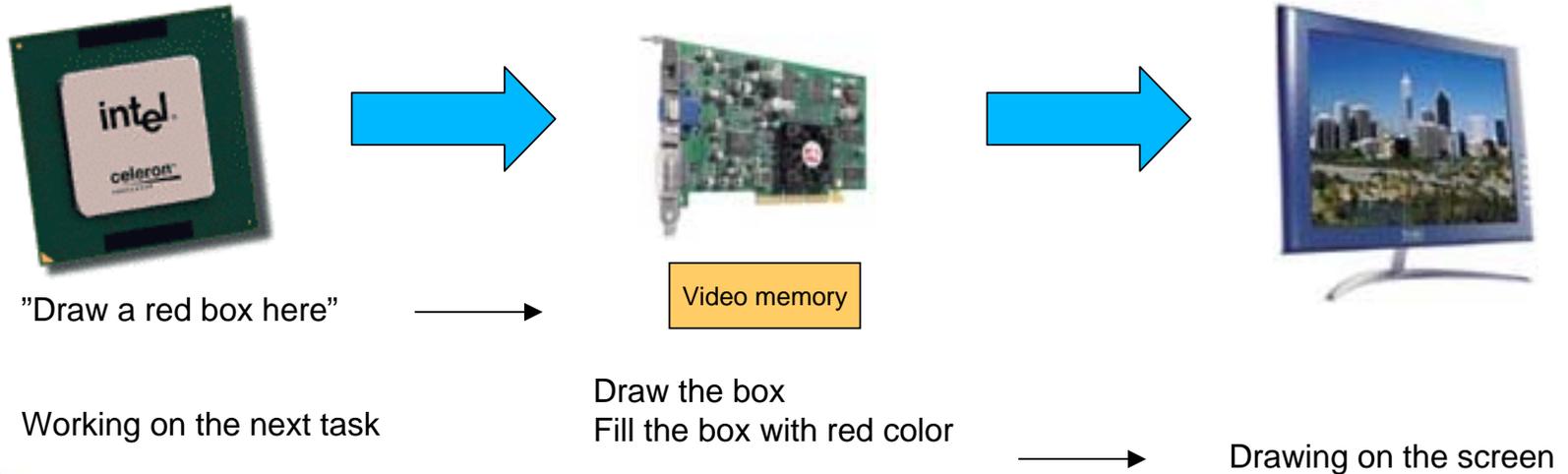
(Very) Restricted hardware environment

- **ALU Power:** Athlon 1.2 (**3886** Dhrystone MIPS ALU) on the ADI msp430 mcu around **30** (=486DX33)
- **Graphical Power:** GeForce 3 (57 M transistors ... 42 M Pentium4) on our HW no graphic card !
- **RAM:** On a PC **128 MB** on ADI msp430 BB chip **0,125 MB** SRAM on chip
- **Storage:** On a PC **10240 MB** HD on a phone **1MB** flash chip

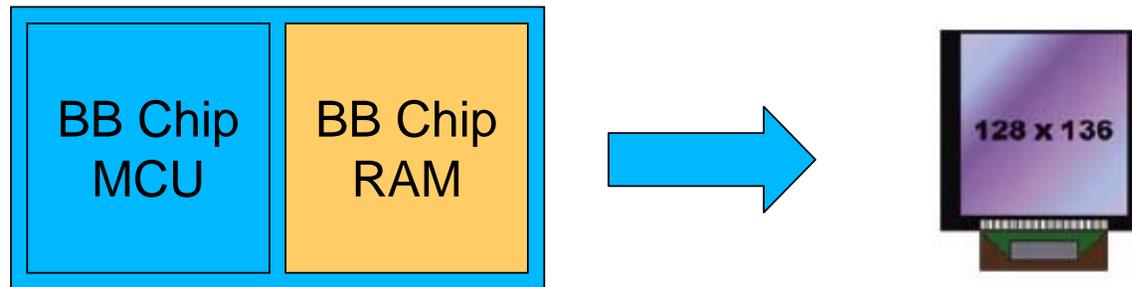
Dhrystone programs are by Reinhold Weicker

Working without graphic card on a smaller CPU

- Graphics processing on PC



- Graphics processing on a mobile phone



Java or C/C++

- Java

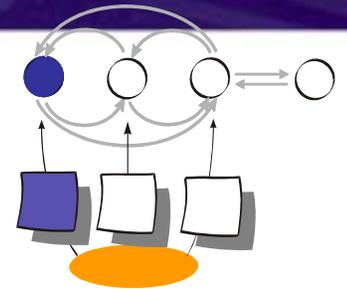
- Popular
- Good marketing
- Slow for games, big footprint
- Not too good at graphics
- Supposedly platform independent
- Not popular with Game Developers

- C/C++

- Operators have not heard of it
- Target compiled code implies high security issues
- Fast, small, cheap and good for graphics
- Portable (TTPCom SW, Brew, Epoc, PocketPC, PalmOS, Win32, ...)
- Popular for Game Developers

WGE Platform

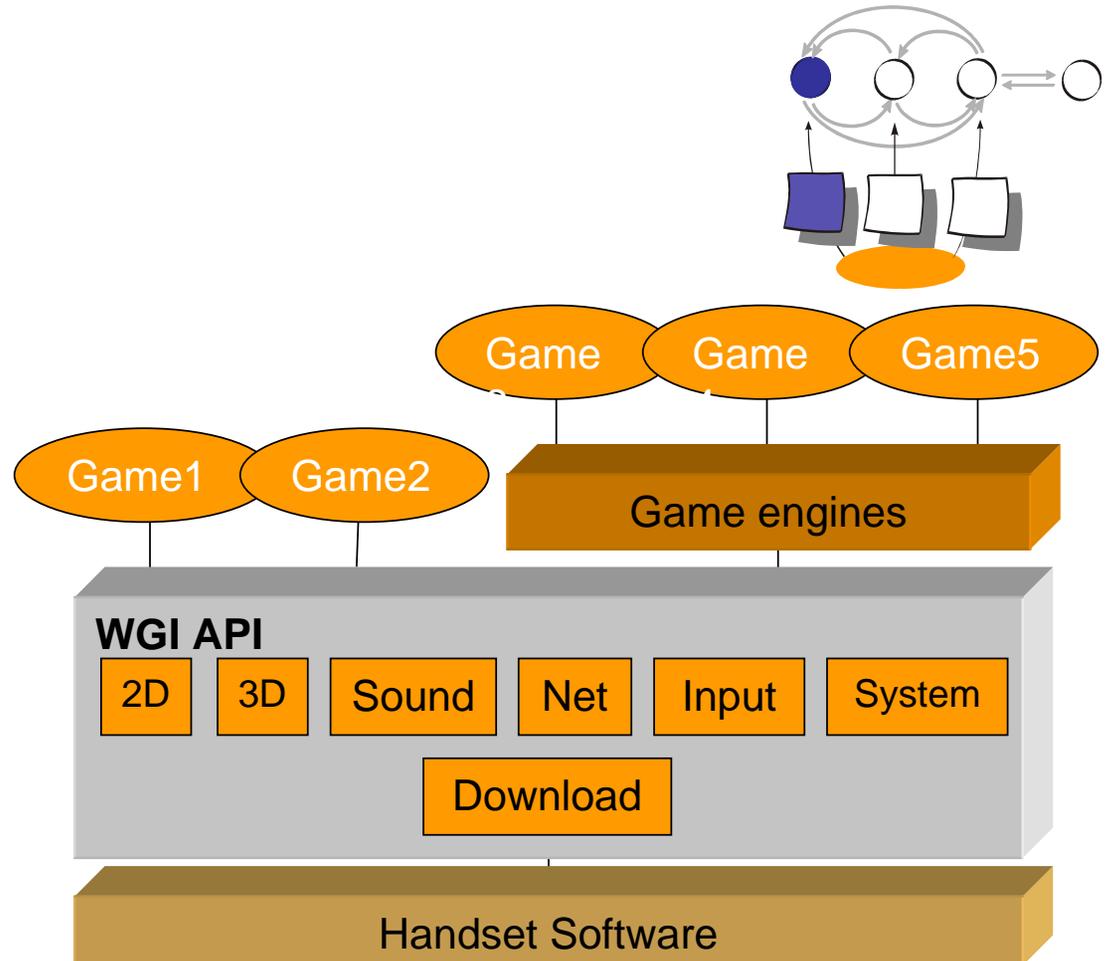
- Optimised for 3rd party developers – easy to develop games
- 2D and 3D engines
- Provides clean interfaces to
 - Network resources
 - System resources
 - Media, input and output resources
- Games are compiled for the native controller and executed faster than interpreted games
- WGE takes the most out of the available hardware
- OTA safe download (MExE compliant)



WGE Global Architecture

Modules

- WGE 2D
- WGE 3D
- WGE Sound
- WGE Net
- WGE Input
- WGE System
- WGE Download



Technology overview

Handheld Gaming

Nintendo Handhelds 1980



Matrix LCD

Nintendo GameBoy 1990-2001



8 bit Z80
160*140
Bw



32 bit ARM7
240*160
Colour

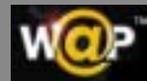
Wireless Mobile Gaming

Proprietary Games
Since 1993

C code
Single Layer
BW
Low fps
Compact

ML Games
1999

Single layer
Low fps
Multiplayer



VM Games
2000

Single layer
Low fps
Sprites
BW/Colors
Power consuming



Footprint :
**150-
>400kB**

J2ME

Basic 2D gaming

WGE
2001

Multiple layer
High fps
Transparency
Tiles/Sprites

BW/Colors
Compact
C++ code
Mutliplayer

Footprint :
40kB

WGE
2002-2003

3D
C++ AND Java Interface
MGIF Compliance

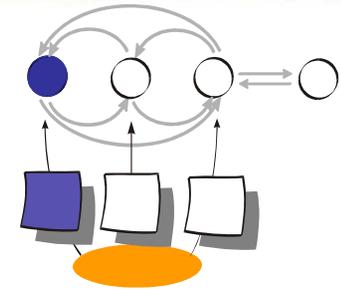


Highly Interactive

2D/3D Gaming

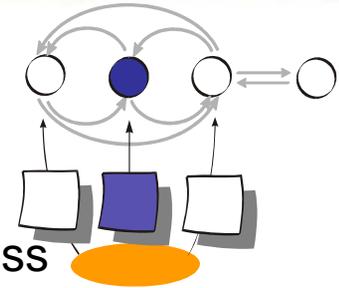
WGE Memory budget

	FLASH	Runtime RAM Excluding display buffer
WGE 2D,INPUT,SOUND,SYSTEM,NET	42 kB	0,1 kB
Secure Download Module WAP interface+crypto Can be reduced	20 kB	7 kB
Hurricane Space Fighters 4 Greyscale	30kB	1kB
Hurricane Space Fighters 256 colours palette for 16bit display	75kB	1kB



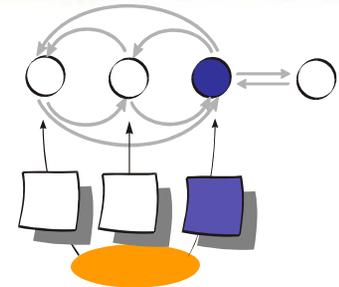
WGE SDK & support

- WGE is programmed using a C++ interface
- Open API to ensure all interested Game Developers have access
- WGE is delivered with a full SDK
 - Documentation
 - Simulator – wrapper WGE->DirectX on Win32 platforms for fast evaluation and development
 - Game Engines
 - Sample games
- Evaluation board are available
- Courses and maintenance programs

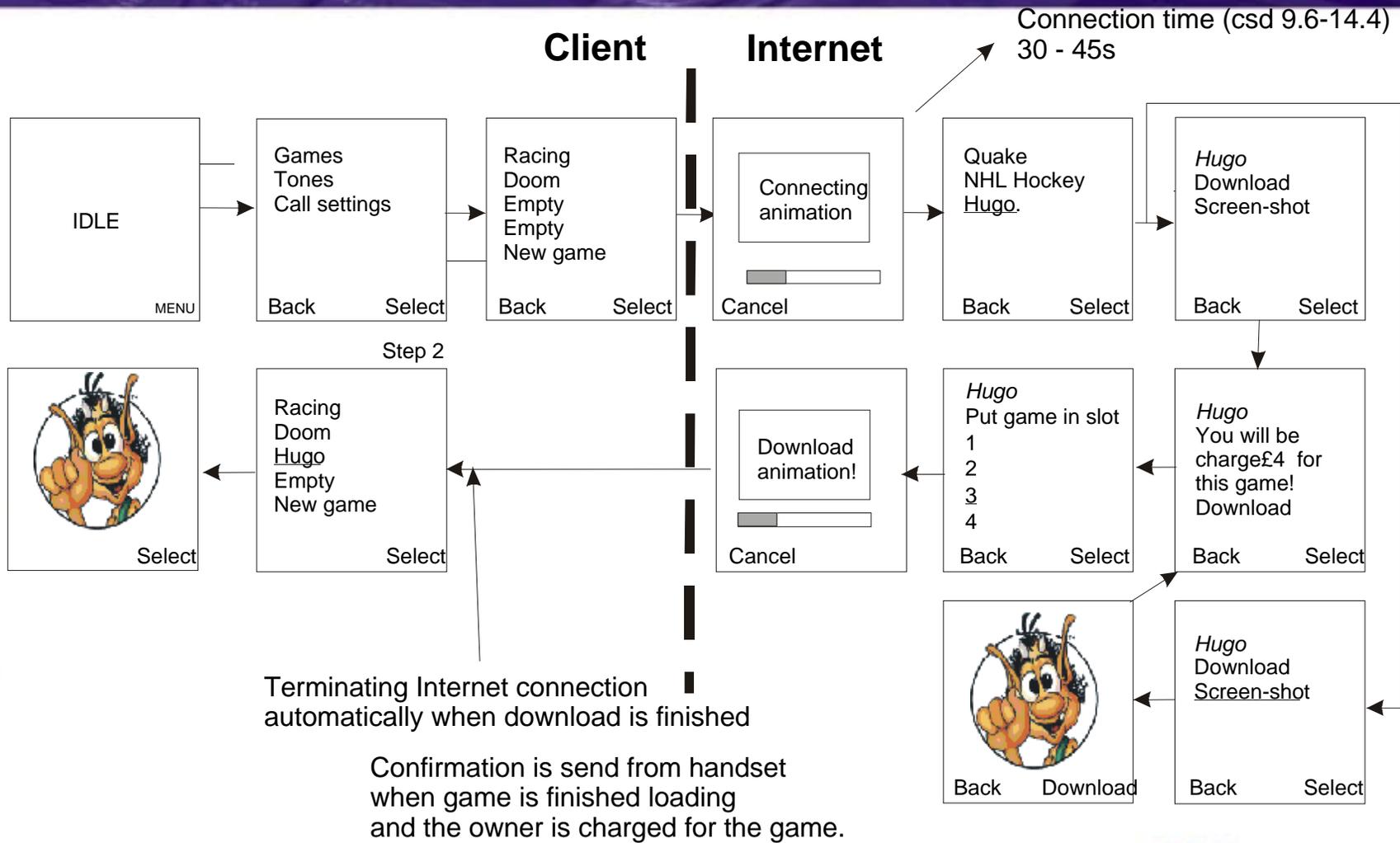


WGE Server & Support

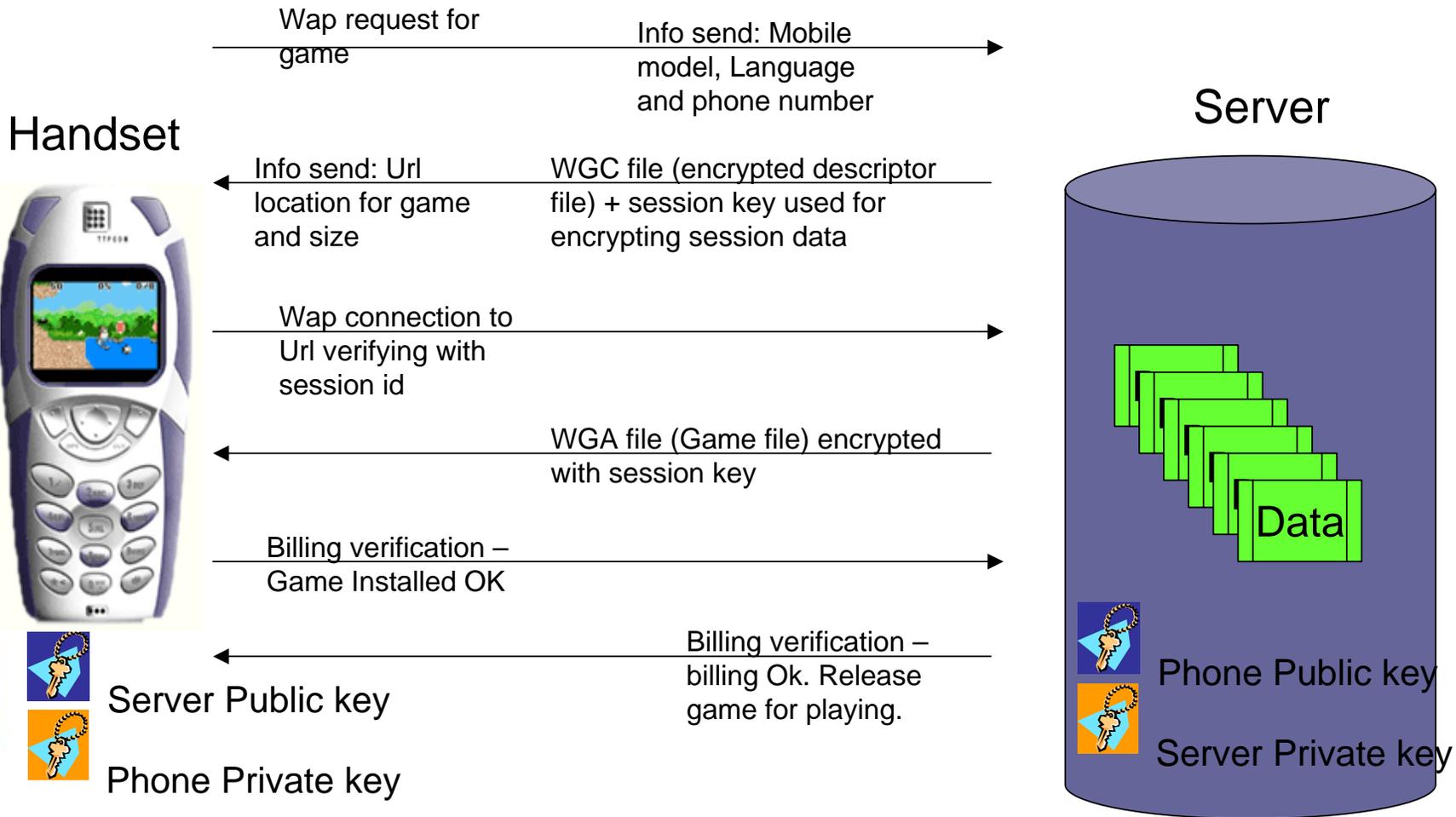
- The WGE server supports WEB, WAP or I-Mode sites providing access to wireless entertainment services and applications
- The Server contains
 - Downloadable games
 - Games related content (high score, tips, ...)
 - Games forum
 - Chat
- The server supports
 - Multiplayer games
 - Multiplatform games
 - Contests and events
 - Branding, sponsoring, commercials
- Admin features
 - Games adding / removing
 - Customer support
 - Reporting module



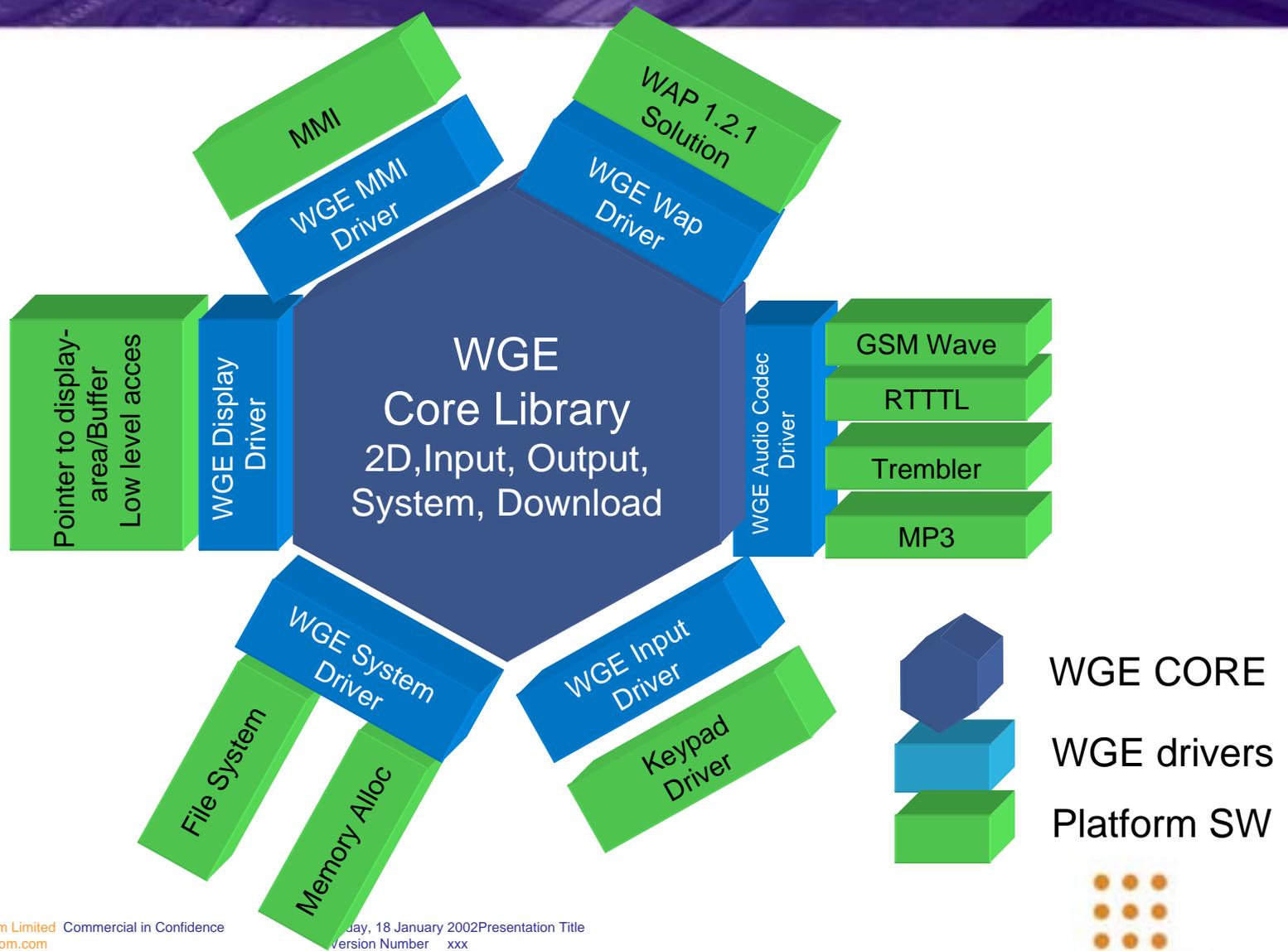
MMI EXAMPLE ON HANDSET



SAFE DOWNLOAD SYSTEM



Porting



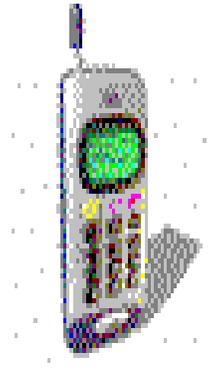
Game studios



www.9dots.net



Questions



Thank you
Questions?