

IBM Cellular Computing

2004 Emergence and Impact on Enterprise and Consumer Businesses

TABLE OF CONTENTS

PREFACE I

PART A

1. DRIVERS OF BLUE GENE SYSTEM AND CELLULAR COMPUTING DEVELOPMENT 1-1

 1.1 New Way to Build Servers 1-9

 1.2 Outside-In Design Approach 1-11

2. CELLULAR COMPUTING OVERVIEW 2-1

3. OVERVIEW OF BLUE GENE CELLULAR COMPUTING SYSTEMS 3-1

 3.1 Blue Gene Class Supercomputing Systems 3-1

 3.2 Blue Gene System Status 3-3

 3.3 Blue Gene/L System Overview 3-6

 3.4 Semiconductor Content 3-12

4. BLUE GENE/L CARD SUBSYSTEM 4-1

 4.1 Semiconductor Content of the Node Card 4-2

 4.2 Node Card Power Consumption 4-2

 4.3 Node Card System Performance 4-3

5. BLUE GENE/L COMPUTE NODE (CELL) 5-1

 5.1 Compute Node (Cell) Analysis 5-1

 5.2 Compute SoC (BLC) Chip Design Details 5-5

6. BLUE GENE/L NETWORKS 6-1

 6.1 Torus Network 6-1

 6.2 Global Combining/Broadcasting Tree Network 6-4

 6.3 Global Interrupt and Barrier Tree Network 6-4

7. BLUE GENE/L SYSTEM SOFTWARE 7-1

 7.1 Programming on BG/L Machine 7-5

8. BLUE GENE FAMILY OF CELLULAR COMPUTING MACHINES 8-1

 8.1 Use of Timelines as Business Intelligence Tools 8-7

9. BLUE GENE/L MACHINE HARDWARE TEAM 9-1

10. FUTURE OF IBM CELLULAR COMPUTING TECHNOLOGY 10-1

 10.1 Merging Blue Gene and STM Cell Processor Development Streams 10-1

 10.2 Drivers of Cellular Computing in Digital Media Systems 10-4

 10.3 Why is Cellular Computing Irresistible to IBM and Sony? 10-5

PART B	11-1
11. IBM'S NEW MERCHANT MARKET MICROELECTRONICS STRATEGY	11-1
11.1 Engineering & Technology Services	11-5
11.2 Technology Enablement Sphere	11-5
11.3 Technology-For-Sale Business Model	11-6
11.4 Five Implications of the New Merchant Market strategy	11-10
12. IBM TECHNOLOGY SOLUTIONS BUSINESS MACHINE	12-1
12.1 Introduction	12-1
12.2. Domain Tree Model	12-4
12.3. Common Thread to the Entire IBM Business Machine	12-9
12.4. The New Electronic Design Technology Solutions Function	12-10
12.5. Summary	12-11
13. IBM TECHNOLOGY ORGANIZATION STRUCTURE (JUNE 2004)	13-1
13.1. Top-Level View	13-1
13.2. Engineering and Technology Services (E&TS) Function	13-3
13.3. Technology and Manufacturing Services Function	13-4
13.4. Remaining Technology Business Functions	13-7
14. CHARACTERISTICS OF IBM'S RESEARCH DIVISION	14-12
14.1 Automation of System-Level Processes	14-1
14.2 IBM's Business and Technology Fabric	14-2
14.3 IBM System Modus Operandi	14-3
15. ABOUT THE PETROV GROUP	15-1
15.1 PETROV GROUP	15-1
15.2 OUR 2004 Mixed-Signal Study	15-3

IBM Cellular Computing

2004 Emergence and Impact on Enterprise and Consumer Businesses

LIST OF FIGURES

1	Basic Cellular Computing Node (Cell)	1-6
2.	IBM Cellular Computing Mission	1-10
3.	Outside-In System Design Approach	1-12
4.	IBM Annual Business Planning and Execution Cycle	2-2
5.	Blue Gene/L Overview	3-2
6.	IBM CC Roots at Columbia Watson Lab.....	3-4
7.	512-Node BG/L Prototype	3-5
8.	Blue Gene/L Packaging Overview	3-7
9.	BG/L Cell SoC Package	3-11
10.	Integration and Density Model Scenarios	4-6
11.	Blue Gene/L Compute Node (Cell)	5-2
12.	PG Estimate of BG/L Cell Size	5-7
13.	BG/L System Networks	6-2
14.	BG/L System Software	7-2
15.	Blue Gene/L Nodes	7-4
16.	IBM Cellular Computing Cascade Formation	8-2
17.	PG Estimate of Cell/L Design Team.....	9-2
18.	PG July Press Release on IBM CC Report	10-2
19.	IBM's New Strategy: Technology -for-Sale	11-2
19A.	Major Implications for Customers and Competitors	11-3
19B.	"Inside" and "Outside" MPU Universes	11-4
19C.	ASIC/COT and Foundry Services Impact.....	11-5
20.	Model of IBM EDA Tool Ecosystem	14-1
21.	IBM Technology Organization Functional Structure.....	12-2
22.	IBM's Technology Solutions Business Machine	12-5
23.	IBM Deployment of the Shorten/Eliminate//Integrate Doctrine	12-6
24.	Internal and External Amplification	12-7
25.	Engineering & Technology Services (E&TS)	13-4
26.	IBM Technology Solutions Business Machine	13-2
27.	Organizational Structure Reflects IBM Strategy	13-3
28.	Technology and Manufacturing Services	13-5
29.	IBM Technology Group Organization Structure	13-8
30.	Microelectronics Division—Organizational Formation	13-9
31.	Semiconductor Products	13-10
32.	Critical Role of IBM's Research Division.....	13-14
33.	IBM EDA Tool Exposure Timeline Example	13-16