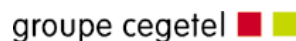
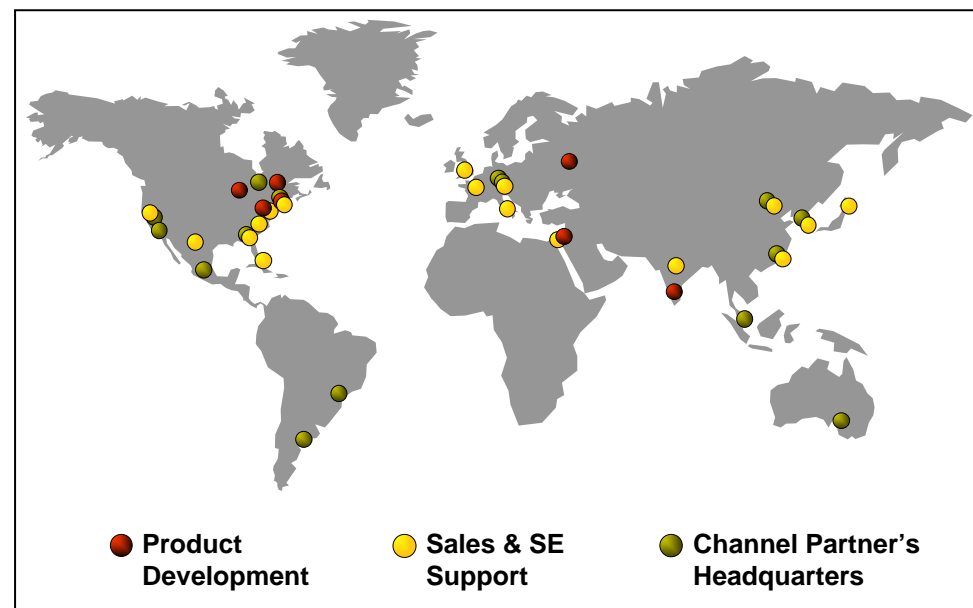




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NMS at a Glance

- **Founded in 1983, publicly traded since 1994**
- **Technology and solutions**
- **Designed into products deployed in 90 countries**
- **Major telecom operators, equipment and solution providers rely on NMS**





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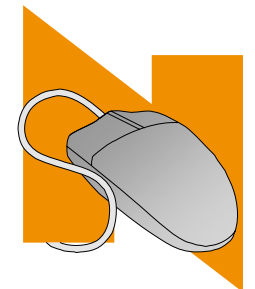
20+ Years of Telecom Innovation

- **Open Communications**
 - ◆ **Deploy in any network — TDM to IP**
 - ◆ **Blade to system versatility; superior scalability**
- **Innovative, future-proof solutions**
 - ◆ **Rapid ROI**
- **Blue chip partnerships**
 - ◆ **Applications, content, integration, support**



Migrating to Second-Generation CG Series Boards

David Asher, Director, Product Marketing



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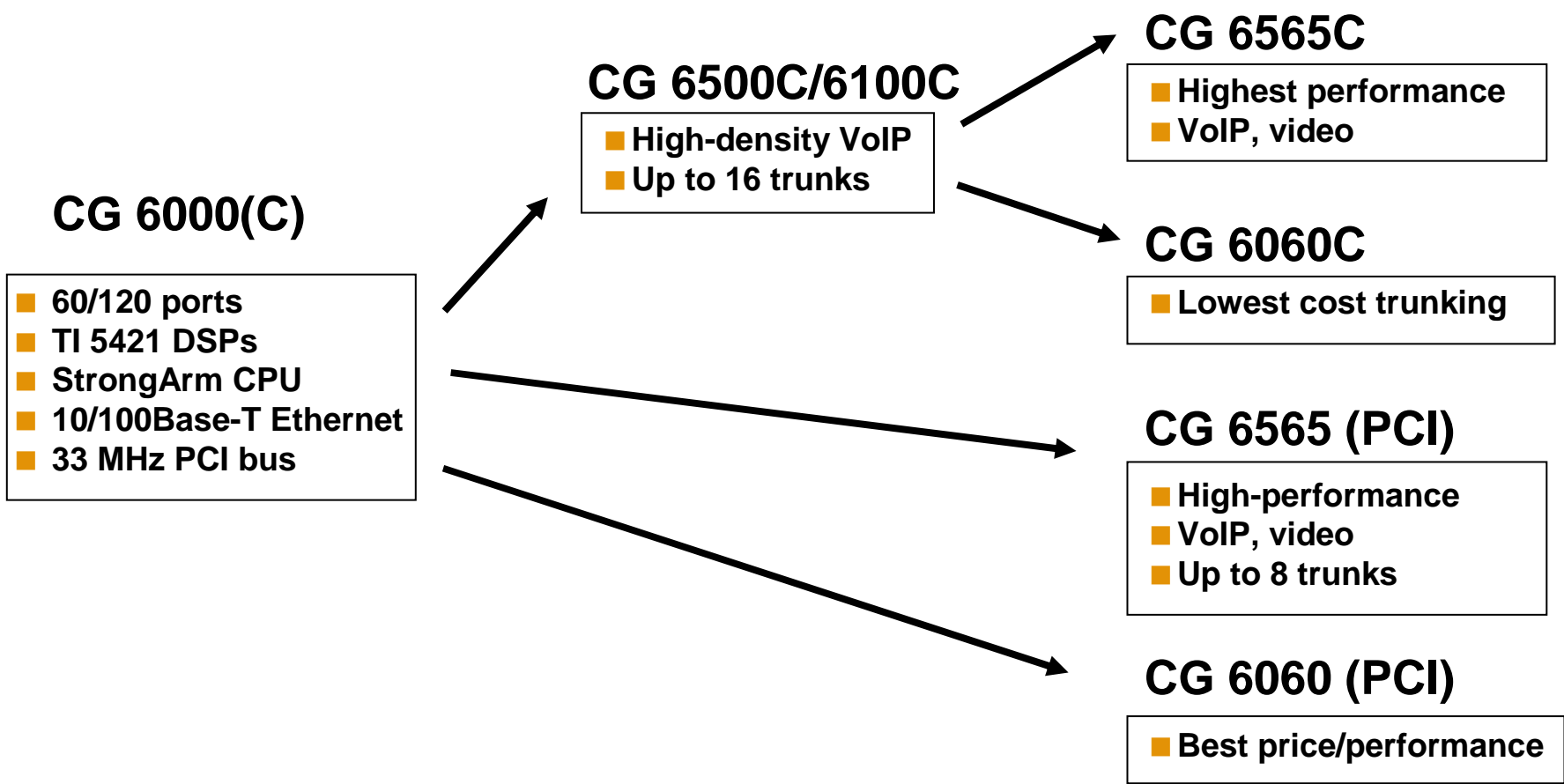
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Agenda

- **Migrating to CG 6565 and CG 6060 boards**
- **Second-generation CG Series boards**
 - ◆ Hardware changes
 - ◆ Availability; schedules
- **Estimating CG Series board performance**
 - ◆ Packet processing limits
 - ◆ DSP processing limit
 - ◆ Load test results



Migration to New CG Series Boards





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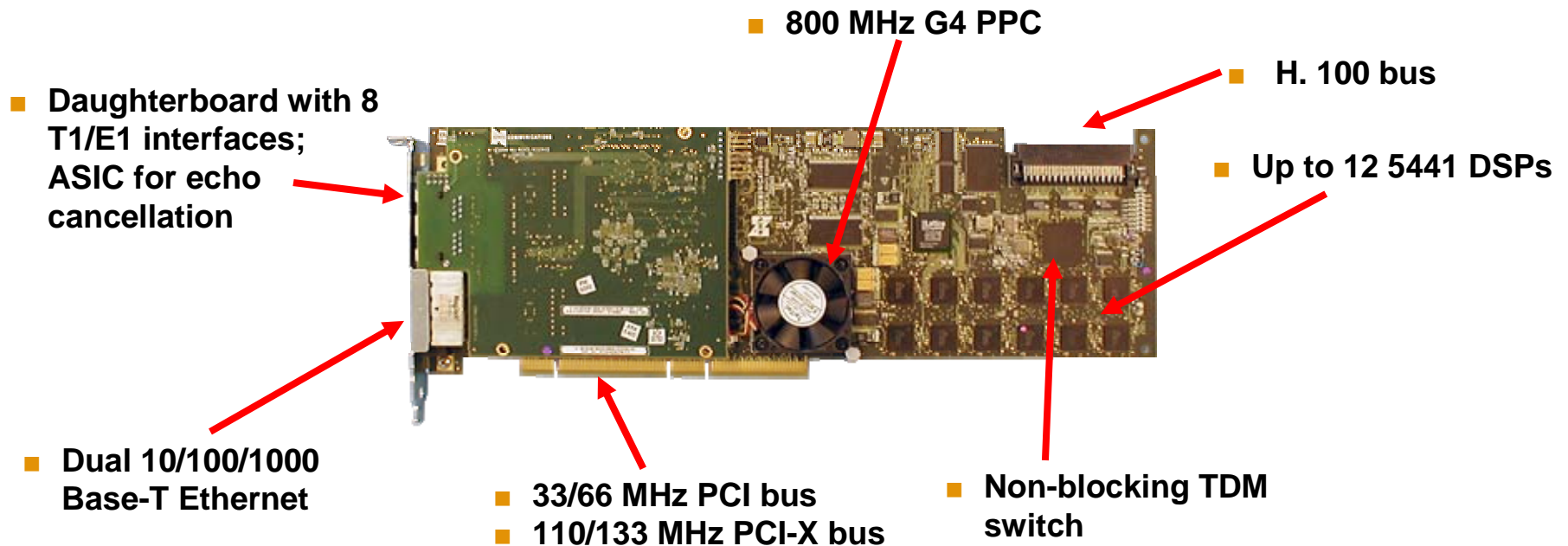
Porting to the CG 6565

- **Installation and Developers Manuals**
 - 62415-12 for CG 6565
 - 62419-11 for CG 6565 C
 - ◆ See Overview Section, “Migration Information”

- **Limited number of changes required by new hardware**
 - ◆ System configuration file
 - ◆ Board keyword file
 - ◆ Booting sequence
 - ◆ Board information



CG 6565 — Support for up to 240 Ports in a Single PCI Slot



- Highest packet and video performance
- For IVR, media services and VoIP gateways



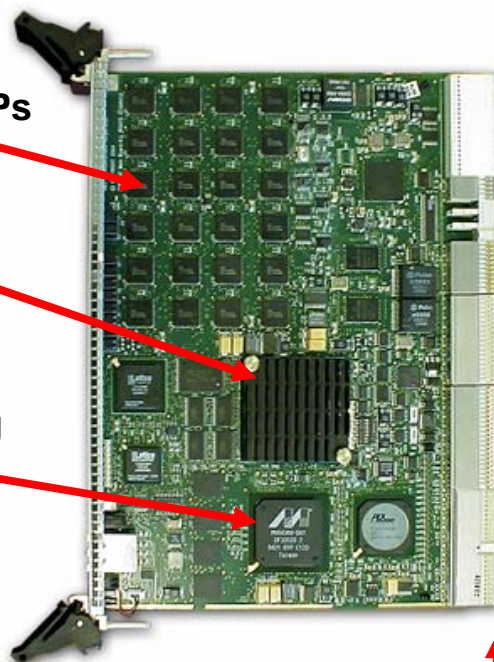
CG 6565C — Support for Dense Media Server and Gateway Applications

- Up to 24 TI 5441 DSPs

- 800 MHz G4 PPC

- Fully non-blocking TDM switch

- CompactPCI for highest density and carrier grade



Rear Transition Module

- Up to 16 T1/E1 trunks
- Up to 480 ports echo cancellation
- Dual 10/100/1000Base-T Ethernet

- H.110 bus support
- PICMG 2.16 compliant

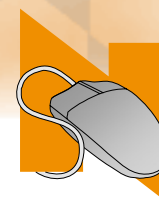


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CG 6060 (C)



- **Most cost-efficient voice processing**
- **For IVR, media services and VoIP gateways**
- **4 T1/E1 trunks, PCI**
- **16 T1/E1 trunks, CompactPCI**
 - ◆ **For trunking applications**



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New CG Performance Features

Feature	CG6565	CG6000 & CG6500
DSP	C5441 — 4 cores per chip at 133 MHz	C5420 — 2 cores per chip at 100 MHz
VoIP Engine	Faster PowerPC	Slower StrongARM or PowerPC
Ethernet	Up to Gigabit Ethernet	Only 10/100Base-T
Echo Cancellation	ASIC on all ports, 128 msec	DSP-based, typically limited to <32 msec
Call Signaling	Hardware-based	DSP-based
TDM Switching	Fully non-blocking	Limited capacity, caused resource constraints
PCI Bus	PCI-X to 133 MHz, 64-bit	Limited to 32-bit



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CG 6565/CG 6060 Rollout — Key Dates

Event	2005				2006			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
CG 6565 first ship			30-Jun					
CG 6565 Beta			15-Jul					
CG 6565 GA				11-Nov				
CG 6565C GA				16-Dec				
CG 6060 Beta					Feb			
CG 6060C Beta					Mar			
CG 6060 GA						Apr		
CG 6060C GA						May		
Last Buy CG 6000/6100							30-Sep	
Last Ship CG 6000/6100								30-Dec

- **NMS will make all products RoHS-compliant, including CG 6000 and CG 6100**



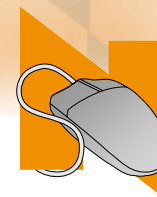
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CG 6565 Series Performance

- **Based on board performance analysis for 14 “Use Cases”**
 - ◆ **Focus on VoIP capacity**

- **CG board capacity limited by 3 factors**
 - ◆ **PSTN Interfaces**
 - ◆ **Board controller runtime utilization**
 - ◆ **DSP processing**

- **Performance can be improved by**
 - ◆ **Utilizing native play/record feature**
 - ◆ **Eliminate DTMF detection if not needed on RTP channels**
 - ◆ **Configure simplex RTP connections where possible**
 - ◆ **Managing DSP resources in DSP “pools”**
 - ◆ **Reducing DSP consumption through ASIC echo cancellation**



Fusion VoIP Ports per DSP Core

CODEC	Ports/core
SINGLE CODEC CONFIGURATIONS	
G.711	12
G.726	6
faxt38.relay	7
AMR	5
G.723	6
G.729	6
TWO CODEC CONFIGURATIONS	
G.711 & G.729	6
faxt38.relay & G.729	6
G.729 & G.723	6
G.711 & AMR	5
G.729 & AMR	5

THREE CODEC CONFIGURATIONS	
G.711 & faxt38 & G.729	6
G.711 & faxt38 & AMR	5
faxt38 & G.729 & G.723	6
faxt38 & G.729 & AMR	5
FOUR CODEC CONFIGURATIONS	
G.726 & G.711 & faxt38 & G.729	6
G.726 & G.711 & faxt38 & AMR	5
faxt38 & G.723 & G.729 & AMR	5



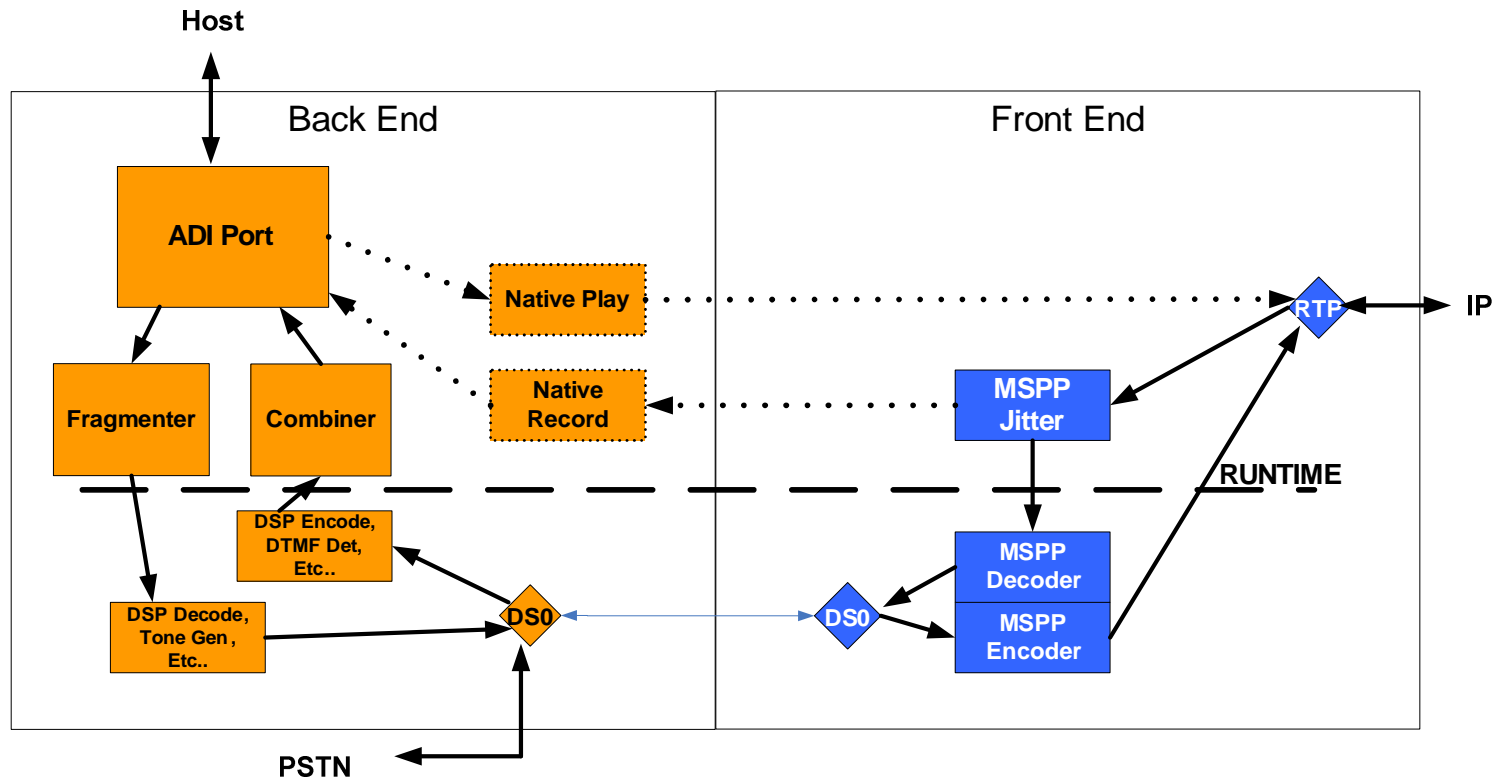
IVR Ports and Other DSP Processing

- **IVR ports (back-end processing)**
- **Conferencing ports per DSP core: 32**
- **Fax ports per DSP core: 11**
- **When in doubt use actual “resource string”**
 - ◆ **Boot board with single DSP in its own pool and increase the number of ports until the limit is reached**

Resource	Ports / core
Normal play/ record with DTMF	12
G.729a play	32
G.729a record	8
G. 723.1 play	32
G.723.1 record	7



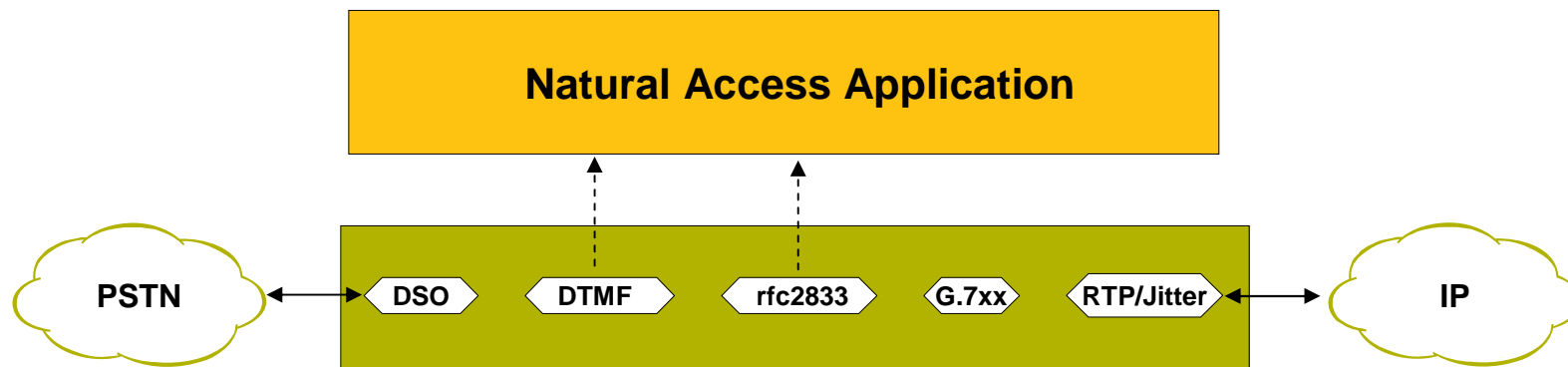
Controller Runtime Utilization



- Runtime processing can be limited by either RTP processing (front end) or ADI port buffer processing (back end)



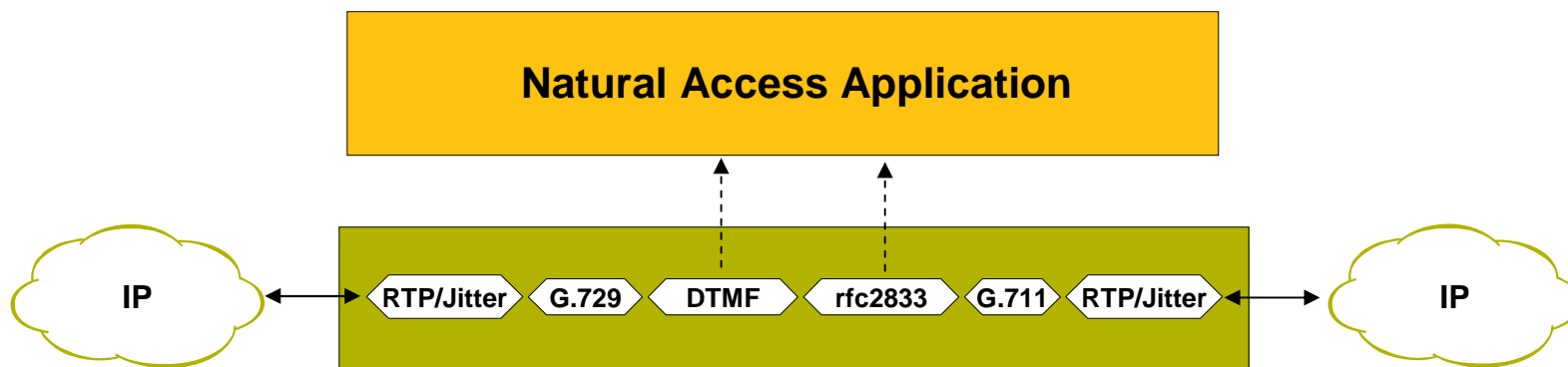
PSTN-to-IP Gateway



- **240 ports for CG 6565/64 (PCI)**
 - ◆ Resource limitation is PSTN Interface, 8 T1/E1
- **360 ports for CG 6565C/128**
 - ◆ Resource limitation is runtime utilization for G.711, 20 ms packets
 - ◆ > 360 ports for compressed media (e.g. G.729, etc)
- **RTP packet processing load only (no host play/ record)**
- **Assumes sufficient DSP processing**



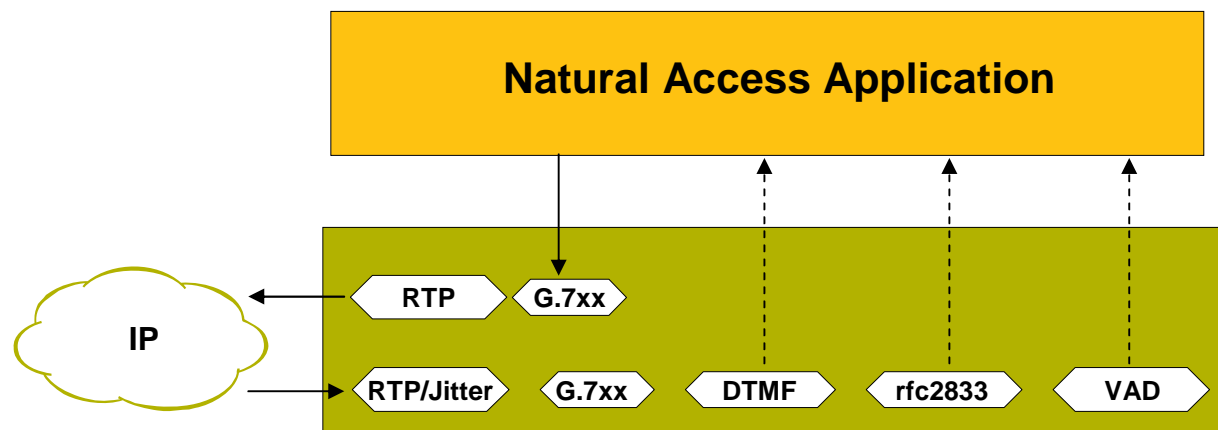
IP-to-IP Gateway



- **G.729 RTP to G.711 RTP Conversion**
- **160 ports for CG 6565/64 (PCI)**
- **320 ports for CG 6565C/128**
- **Resource limitation is runtime utilization**
- **RTP packet processing load only (no host play/ record)**
- **Assumes sufficient DSP processing**



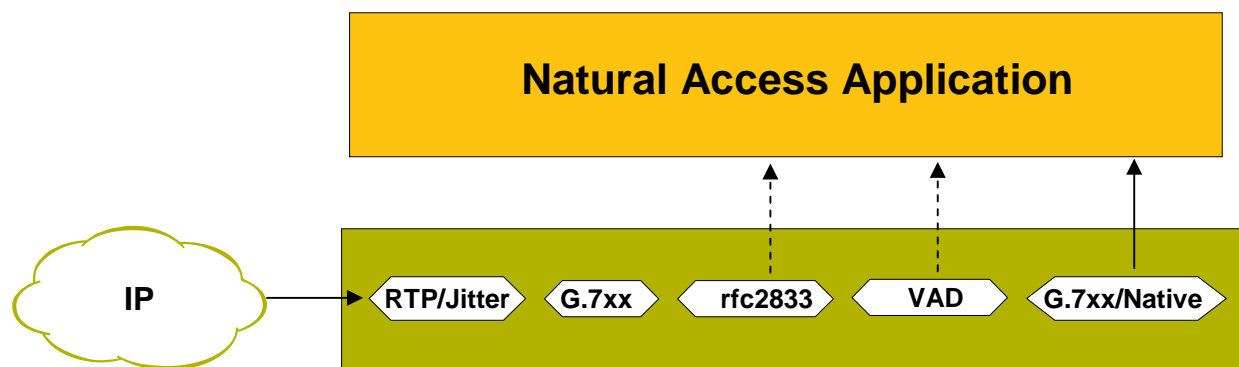
IP Announcements and IVR Prompts



	CG 6565/64 (PCI)	CG 6565C/128
G.711 Announcements	420	500
G.711 Prompts	240	250
G.729A Announcements	500	500
G.729A Prompts	350	350
G.711 + G.729A Announcements	256	350



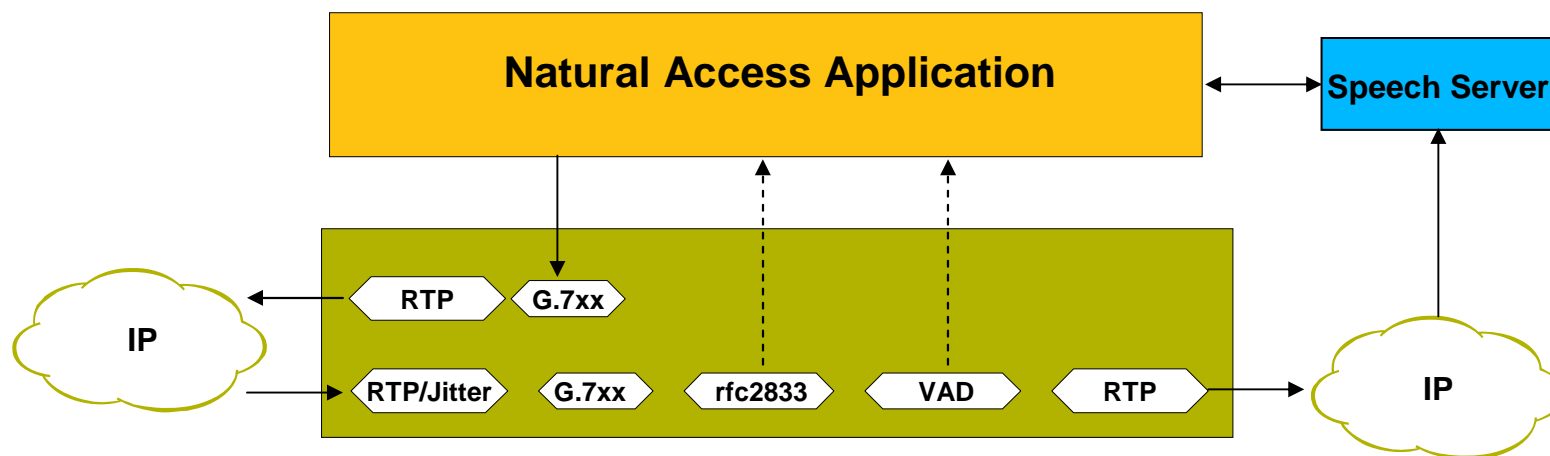
IP Voice Messaging (Cases 8-10)



	CG 6565/64 (PCI)	CG 6565C/128
G.711 Native RTP Recording	350	400
G.729A Native RTP Recording	500	500
G.729A RTP Record to WAV	240	400



IP IVR with Speech Recognition



- Application receives DTMF and voice barge-in events
- RTP connection to ASR is always G.711 simplex

	CG 6565/64 (PCI)	CG 6565C/128
G.711 Speech-Enabled IVR	224	350
G.729A Speech-Enabled IVR	272	400



IP IVR and Conferencing

- **Three-party conferences are benchmarked**
 - ◆ **Worst-case for conference mixing load**
- **Each caller is full-duplex G.711 or G.729A, 20 ms packets, VAD, DTMF enabled; silence suppression disabled**
 - **CG 6565C is limited by runtime utilization**
 - **CG 6565 (PCI) is limited by DSP utilization**

	CG 6565/64 (PCI)	CG 6565C/128
G.711 3-party conferencing	252	360
G.729A 3-party conferencing	190	360



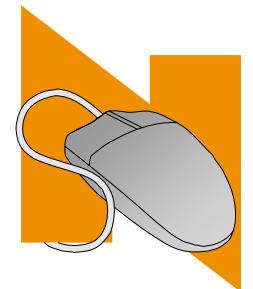
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Summary

- **CG 6565 provides more power for applications and more flexibility to tune the board's capacity**
 - ◆ Flexible assignment of vocoders
 - ◆ Use of resource pools
- **Use Cases provide a method for estimating application performance**
 - ◆ But real applications still require load testing
- **Native play/record can dramatically improve IP media server performance**

Questions?

**For future questions, contact:
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Product Manager, CG Series Boards
jack_chase.nmss.com**



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Upcoming Webinars

- **January 10**
Simplifying SS7 Programming for Enhanced Intelligent Network Services
- **February 7**
Implementing 3G Video Services Using Video Gateways
- **March 15**
Building Applications Fast with Vision Media Servers



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Thank You!

Note:

- PDF will be posted today
- Recorded version posted in a few days



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