National Semiconductor

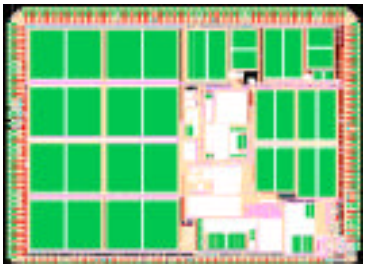
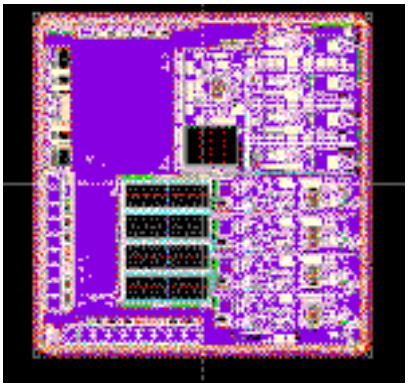
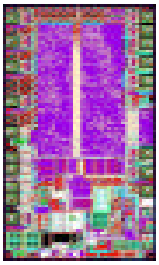
The Sight & Sound of Information

Presentation to EDA Interoperability Forum

Rajesh R. Berigei

4/10/03

NSC Design Expertise

SoC	AMSRF	AMSRF	Analog
			
40M X'tor	**5M X'tor**	**53K X'tor**	**200 X'tor**

National Semiconductor
The Sight & Sound of Information

Importance of Milkyway to NSC

- **To continue to be best in class in the entire gamut of design styles, NSC must stitch many design methodologies and design flows into a seamless working solution.**
- **This requires working with different tool vendors and therefore different design databases and formats.**
- **Synopsys is one of the important tool vendors for NSC**
  - **It is in our interest to see the Synopsys tools working off the Milkyway database – directly translates to our improved productivity.**
- **Milkyway has made our back-end tool flow seamless to a reasonable degree.**
  - **Currently far from perfect – but a good start.**

National Semiconductor
The Sight & Sound of Information

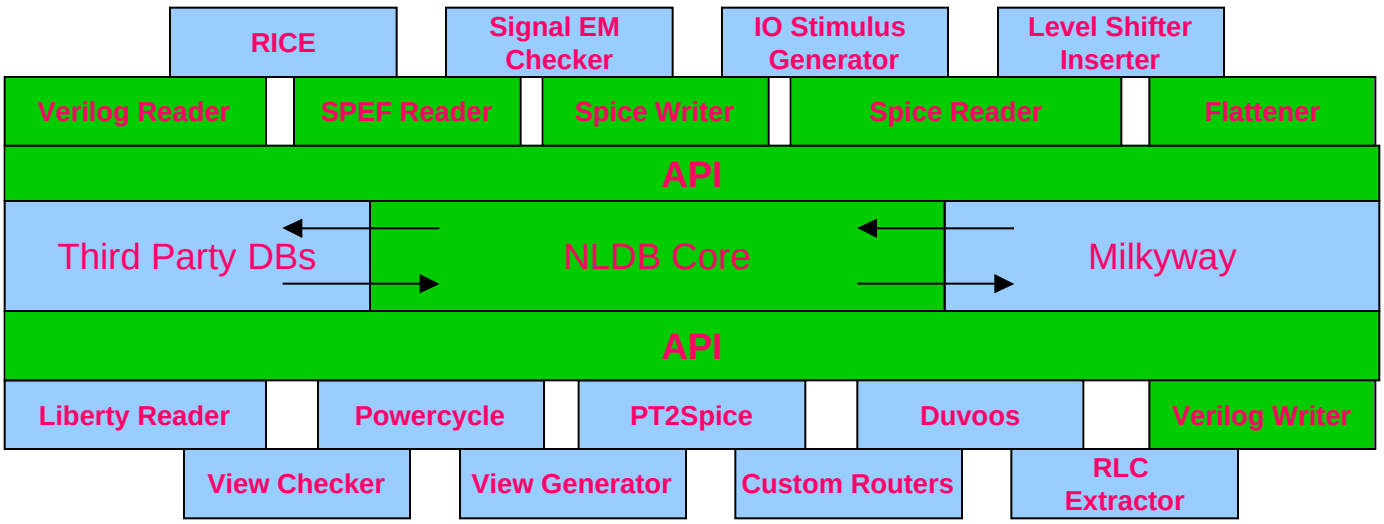
Usage of Milkyway within NSC

- **Most Digital and AMS based product lines at NSC use Milkyway via Apollo or Astro.**
- **A Milkway-based custom router has been developed using the “C” api.**
- **Milkyway is being used for noise repair**
  - **Solution involves a third party tool that does a glitch-enabled analysis of Crosstalk and provides a feedback repair path back to Milkyway.**
- **Milkyway is being used for implementing NSC specific methodology for Antenna correction, ECO and spare gate flows.**

Future direction – NLDB + Milkyway

- **NLDB (Netlist Database) is NSC's contribution towards the goal of tool interoperability.**
  - **High speed, memory efficient netlist infrastructure**
  - **provides efficient gate and transistor level data representation**
  - **Supports multiple supply voltages.**
  - **Caters to Analog, AMS and SOC type of design styles.**
- **A complementary technology to Milkyway.**
  - **Milkyway is the persistent database for NLDB representation.**
  - **No Physical information in NLDB – will reference Milkyway for Physical information.**
- **At NSC, NLDB will be used as a middleware data representation between Milkyway and NSC custom applications.**
- **NSC will be providing NLDB as Open Source**
  - **encouraging the universities that we work with to base their prototypes on NLDB and Milkyway**
  - **motivation – ensure a relatively painless transition from prototype to production relatively painlessly.**

NLDB/Milkyway Architecture



Open Source Components From NSC

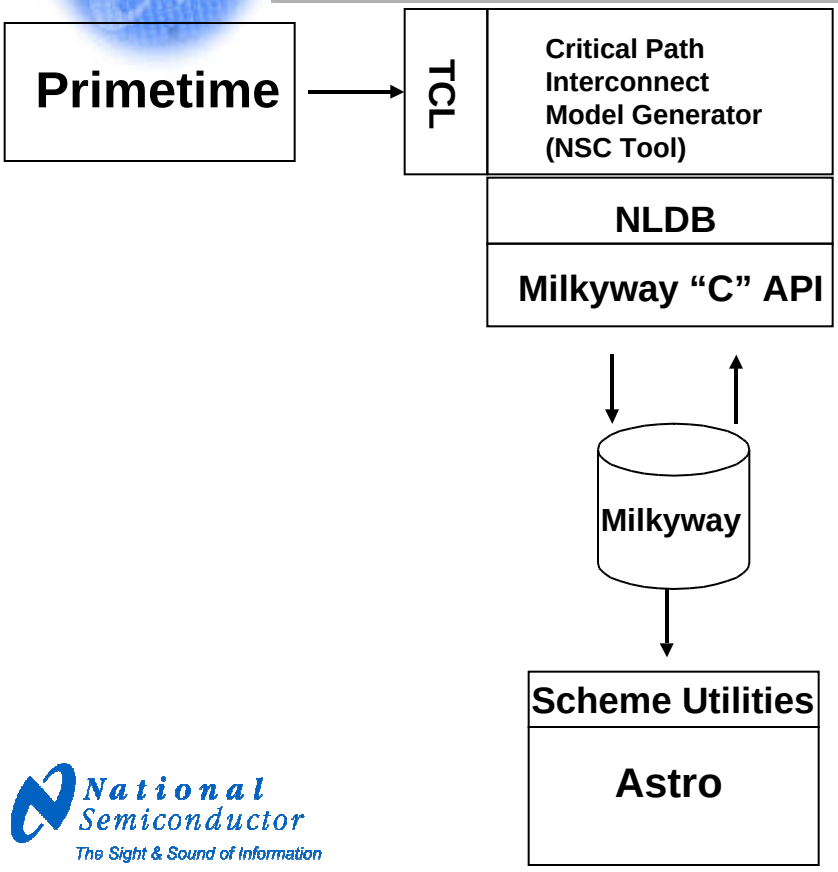
National Semiconductor
The Sight & Sound of Information

Future direction with Milkyway

- **We will continue to develop NSC custom applications using NLDB and Milkyway.**

- **These include:**
  - **Custom flows for Antenna protection, ECO and Spare gate insertion**
  - **Multiple supply voltage manipulation toolset for Mixed Signal designs**
  - **Critical path debug interfaces with Spice**
  - **RLC extractor**
  - **Single pass, post layout signoff quality standby power optimizer**
  - **On-demand library view generator and checker**
  - **IO stimulus generator**
  - **Memory characterization toolset**

Example Interoperability Flow



Create Custom View in Milkyway

Annotate custom Information onto Layout GUI

National Semiconductor
The Sight & Sound of Information

Some Requirements for Interoperability

- **Need Milkyway “C” and Scheme/TCL API for**
  - **Generation and access of all reference library views.**
  - **Generation and access of all design views.**

- **Substantially improved documentation of the Milkyway “C” API.**
  - **Cross referencing between Scheme and “C” API’s would be beneficial.**

National Semiconductor
The Sight & Sound of Information