

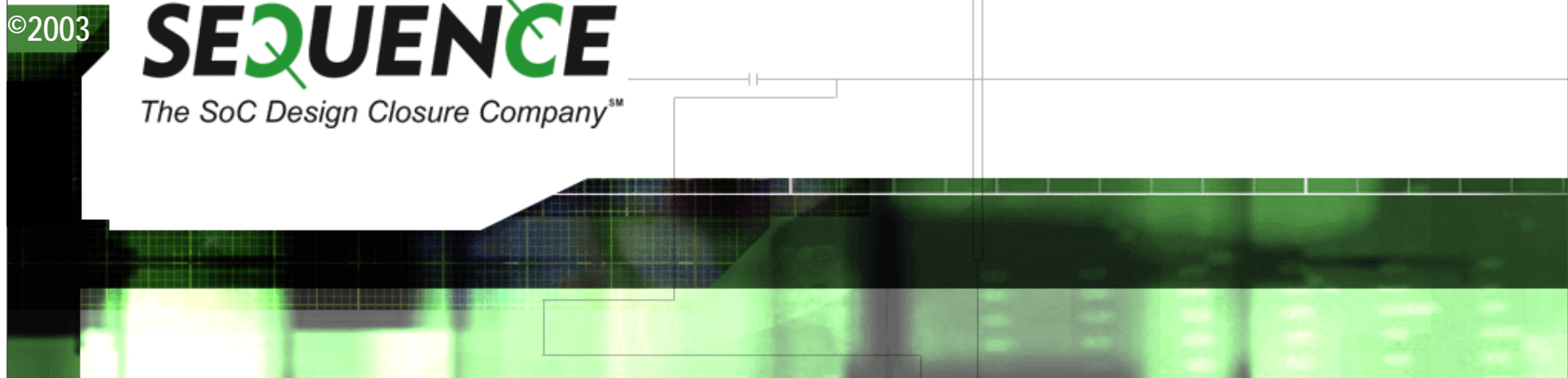
# Extraction Stage™ Milkyway Interface



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**SEQUENCE**  
*The SoC Design Closure Company<sup>SM</sup>*



# Target Interface:

## Avant! Tools into Columbus Parasitic Extractor

### ■ Standard Cell Extractor

- Geometry Based
- Post Place & Route
- One Way Interface (Data Out)

### ■ Full Custom Extractor

- API Not Available Yet
- Focus on Standard Cell

# Standard Cell Extractor

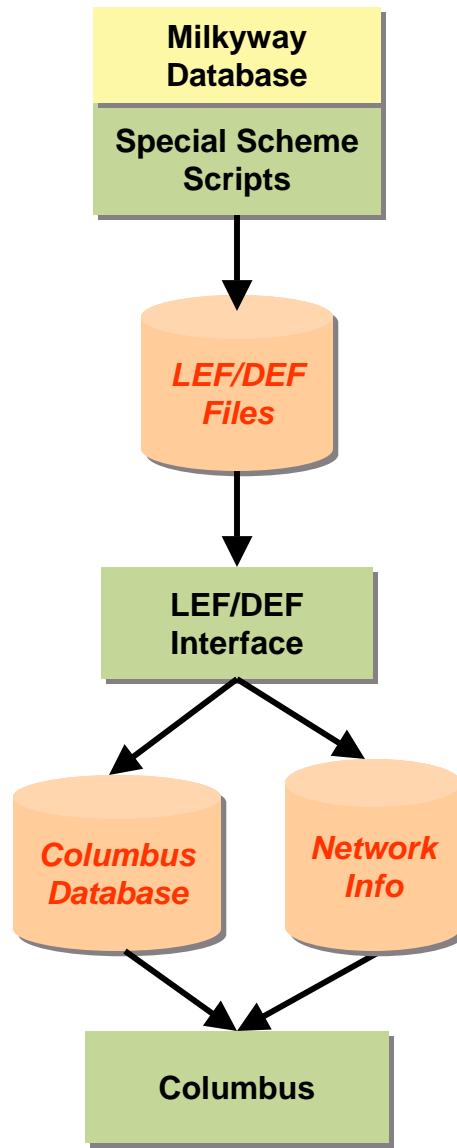
## ■ What We Need: Geometry Info

- Routing Polygons
- Port Polygons
- Pin Polygons
- Cell Geometry (if available)
  - Cell Blockages if not
- Fill Polygons or Rules
- Track and Grid Info

## ■ What We Need: Netlist Info

- Net Names and Connectivity
- Instance Pin Names and Locations
- External Ports
- Hierarchy Info

# Existing Interface Flow



## LEF/DEF Interface Flow

- Special scheme scripts to dump LEF/DEF files from Milkyway
  - End user must run manually
  - Must use our special scripts
- Columbus LEF/DEF Interface
  - Creates Columbus input files
- Run Columbus

# Issues with LEF/DEF Flow

- **Extra Translation Step**
  - User has to run scripts to generate external data files
- **Extra Set of Data Files**
  - Takes up more disk space
  - User must keep track of data consistency
- **Additional, External File Format**
  - Data incompatibilities
    - Via orientation, (for example)
    - Data resolution issues
  - Loss of Data
    - Not everything in the database makes it into the files

# Issues with LEF/DEF Flow (cont.)

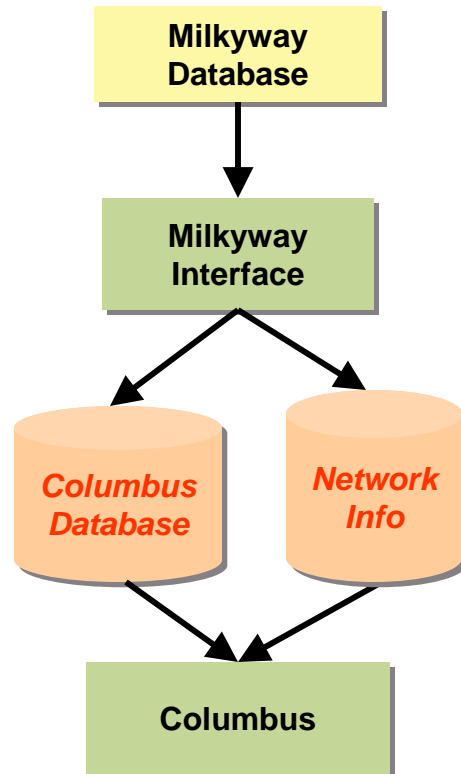
## ■ LEF/DEF Utilities Problems

- Many Bugs in the Utilities Themselves
- Not Officially Supported
  - Have to Debug Problems Yourself
  - Must “Work Around” Bugs
- No Access to Inside Information
  - No knowledge base to draw from
  - No “How-To”s
  - No Examples

## ■ Bottom Line: No Control

- “Learn by Failure” Model
  - Only find issues when customers encounter them
  - Always scrambling for quick fixes and patches
- Can Only Fix with Patches and Workarounds

# New Milkyway Interface Flow



## Milkyway Interface Flow

- Translator can access database info directly
- Creates Columbus input files
- Run Columbus

# Interface Internals

## ■ Foreach Cell in Library

- Process Ports
  - Create Interface Pin
    - Keep port polygon info
- Process all Instances and Instance Arrays
  - Add Each Instance to the Database
- Process Each Net in Cell
  - Get All Attached Objects
  - Add Geometry Objects to the Database
- Pin Search
  - Match Routing to Pin Locations
- Unlabeled Geometry
  - Not All Geometry Attached to a Net
  - Have to Iterate Through All Objects
    - If Object Has NetID of 0, Add to the Database

# “Tricks” In LEF/DEF

## ■ Rectangular Vias

- No Way to Rotate Vias in LEF/DEF
- Fixed in MW Interface – Direct Access to Polygons

## ■ Exact Pin Locations

- No Way to Determine in LEF/DEF – Data Lost
- Not Fixed in MW Interface
  - Can't find it anywhere

## ■ Tie High/Low Polygons

- Not Automatically Output to LEF/DEF
- MW Interface - ???
  - Not Sure Where They Are – Need Example

## ■ Wire Directions

- Wires Occasionally Got Incorrect Direction
- Fixed by MW Interface

## “Tricks” In MW Interface (so far)

- **Net Objects Not All Included in MWXDb\_Get\_NetWiring**
  - Didn't Have Some Polygons and Rectangles
    - What causes these? Hand Routing???
  - Used MWXDb\_Get\_NetComponents Instead
- **Unlabeled Geometry**
  - Where Does It Come From?
    - Fill Polygons?
    - Incomplete/Failed Routes?

# Wish List

- **More Example Designs**
  - Different Design Styles
  - Different Routers
- **Knowledge Base**
  - Collection of Integrator Experiences