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Key Components of a successful Internal IP Sharing Program

This paper will focus on the development and content of an IP reuse package that will provide the knowledge necessary for the IP end user to embrace reuse.

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Introduction

Most organizations today have some type of an internal IP sharing program in place. The systems vary from schematics and layouts in a common directory on the low end to a sophisticated, web based library management tool on the high end. The superiority of the repository should not be the starting point of a reuse program. You must first concentrate on the content details of the deliverables that the end users receive from your repository. Once that is established you are ready to move into the mechanics of defining your repository.

The end user of any IP will be on the hook for the successful implementation in their design. If you want designers to reuse a given block you must sell them on the quality of the design itself and how it will enhance their success. This cannot be a marketing pitch with words, pretty pictures & diagrams. It must be a technical pitch that sells them on the information that is available for them to trust the design for use in their chip.

This discussion of reuse in this document will be referring to analog hard IP. Most of the discussion would also be applicable to a digital soft IP block, however, the end user would have a different set of specific requirements to attain the necessary level of trust for reuse.

IP Reuse Overview

Expectations for IP Reuse

The one goal that every organization has in common is to be faster and achieve a better first time success on their new designs. One area long believed to help achieve this goal is through the use of IP sharing. With an IP sharing program in place the assumption is that you will no longer have multiple design groups designing the same function for their particular chips. Thus, you design and validate it once and use it on all future designs which is an ideal way to enhance your teams bandwidth, reduce your design cycle times and have greater first time success.

Once an IP reuse plan is in place management sits back and waits to reap the benefits. This would be an ideal case and will be reality if the proper motivation for the re-users were in place. The motivation that will drive success is that the end users see real tangible benefits to their chip design by reusing an IP block.

Roadblock to Successful Reuse

If the end user does not feel comfortable about the status of an IP block, he or she will be leery of risking their chip by using it on faith. The end users can make or break your reuse program so it is extremely important that you pay attention to their needs and concerns!

End Users
make or break
reuse.

Know your IP End User

IP Repository

The repository is where your design IP data and documentation will be stored and does not necessarily drive the adoption of an IP sharing program. It's the quality of what's in the repository, from the end users perspective, that will ultimately make or break the adoption of reuse. Focus on the content of your repository first and then follow that with how designers will access the information.

IP End Users will have Concerns of Reuse

End User apprehension comes from the unknowns about what the original designer was thinking, why the design was approached a certain way and how the design was validated, among many others. If the users are not aware of these types of details they will naturally have anxiety about reusing an IP block. Ultimately the end user assumes full responsibility for any part of their design, including any reused blocks. This places them in a very cautious position when it comes to the decision of reuse or doing their own thing. It is completely natural that the end user would be cautious of a block that was done by another designer. Your goal is to get them from cautious to confident in reuse.

One way end users eliminate reuse anxiety is to decide not to reuse. To avoid that decision from becoming a reality you must address the end users reuse concerns. This can be done by allowing them to “get into the head” of the original designer, which can be done through the proper level of documentation. Thorough, end user defined documentation is the most efficient path to minimizing the natural apprehension in reusing a block.

If the documentation of the IP design is not sufficient to remove the end users concerns, then the original designer must be sought out for discussion about the reusable block. Assuming the original designers availability, repeatedly for each instance of reuse, will set your reuse strategy up for many surprises. The original designer must be responsible for leaving behind their written design legacy that covers the thoughts and reasoning they went through on their design.

End User may want to Tweak the IP

In some cases the end user may want to be able to make some changes to the block to meet specific requirements at the chip level. To successfully make these changes it is necessary that they are comfortable enough with the design to understand and deal with the risks associated with the planned modification.

Again, a solid documentation package must provide the end user with enough knowledge to make any changes while minimizing the risks to the overall design. They must be aware of any concerns the original designer had to avoid making a modification that would jeopardize the quality of the modified block. The end user must also have access to documentation that details out the validation strategy used by the original designer.

You Must Understand what Reuse Anxieties Exist

At this point you should understand why the end users have fears about reuse and that minimizing them is the key ingredient of a successful reuse effort. Understanding the

Ensure you have addressed the end users anxieties.

source of these anxieties is where your initial should focus should be. You must diminish or remove the end users concerns about reusing IP in order to move forward.

IP Must be Marketed

The place to start is with your end user community. What do they want in an IP reuse package to make them comfortable about reusing a block from the repository? Solicit inputs about what would prevent or permit the reuse of a block. Pull these together and make note of them for later use. If you leave these important inputs out of your plan, your efforts to build the reuse library will be wasted.

The End User Must want to Reuse a Block

Do you think most end users are in the sidelines waiting for an IP block to come their way; something they might be concerned about making use of; something they may end up being mandated to make use of? The end users of IP need to want it and see positive benefits of using it. Forcing the reuse of IP will only move the lack of thorough documentation by the original designer to the end user, which will only worsen end user buy-in.

You need to market your IP for reuse! Marketing is about showing the end user the benefits of using the blocks from the library. Present the risks of deciding not to reuse a block of IP. Cover the reasons why IP reuse will help them be more successful, the reason's why a given block will work for them. You need to generate excitement and trust of your reuse initiative and the benefits it brings to the chip level design team.

The Needs of the IP End User

Remember the solicited requirements of the end user that were discussed earlier? You must address these by providing them as part of your reusable IP block documentation. Listen first, then plan, then create and then review. A thorough documentation package will definitely be a component of the requirement and your users must have input to the content of that documentation... listen to them. The

end users are the customers hence you must make sure they are involved in your IP reuse strategy decisions.

You Must not Fall Short on Delivery

As with any customer relationship you must make sure that you deliver what you say your going to deliver. As soon as you lighten up on the requirements for a block that will be part of your reuse

Do not allow your end users to get stung by reuse!

library, you may end up compromising the entire reuse strategy. Be sure that you do everything you can to eliminate the possibility of the end user be stung by reuse. Just like any other customer, if they get burned you will have a hard time bringing them back. Stay on the course for IP block requirements! Do not release a block for reuse until it meets the defined requirements.

The IP Package

What Type of Data is Necessary for Sharing

At a minimum I would suggest the following as a starting point:

- Schematic & Layout Library
- Best Practices (how to make a block reusable)
 - Directory structure
 - Mandatory Deliverables
- Block level specification which must minimally include:
 - Chip level integration information

- Test Requirements
- Simulation validation strategy & results
- Reference libraries & model information
- Detailed Circuit Description
- Silicon Validation
- Common shared IP checklist

The above noted information is really the same material that you should put together for any new block to ensure its quality. The additional time to make a block reusable should not be much of an adder over doing a good, quality job for any new block under development.

Format for Written Documentation

I would strongly suggest that the format of your written documentation follows a fixed format template. By fixed format I mean that all documentation should be formatted the same and have exactly the same sections. This makes it a fairly simple task for an end user to find the specific information they need.

Summary

This paper has focused on the IP block end users requirements that are necessary to have a successful IP reuse program in place. Key points to consider for your internal reuse program are as follows:

- The end user needs to be able to “trust” any IP they will be considering for reuse.
- View the engagement of potential end users as you would view any customer/vendor relationship. Market your IP reuse initiative.

- Listen to the end users requirements that will build their trust in the IP. Make sure you cover their needs through appropriate, standardized documentation.
- Be clear about the requirements for a block that is going to be put in the IP repository. Don't jeopardize your total reuse program by allowing IP that does not meet those requirements.

If you do not surprise your end user you should have a very successful reuse program.
