

Software Licensing Models in the EDA Industry

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Abstract – The EDA industry offers a wide variety of software licensing models. However, the definitions of these licensing models and their applicability is neither consistent nor commonly understood amongst the EDA vendor and user communities. This paper broadly characterizes each of the common software licensing models in the EDA industry, illustrates the selection of specific licensing models through a set of criteria and case studies, and proposes solutions to some of the common problems with the current software licensing models.

I. INTRODUCTION

A software license as the name suggests provides the user with the rights to using a piece of software. The license itself maybe permanent or temporary. A permanent license provides the user with a right to use the software on a perpetual basis while a temporary license provides the user with a right to use the software for a finite and fixed period of time.

Nowadays, the business of buying a license(s) from an EDA vendor is becoming increasingly complex. One needs to have answers to a number of questions before buying a license(s) from an EDA vendor. Some of these questions are -

1. What are the licensing models available and what are their characteristics?
2. What are the advantages and disadvantages of each licensing model?
3. What criteria should be used to select a specific licensing model?
4. What are the costs associated with each licensing model?

TABLE I
NODE LOCKED LICENSING MODEL

Pros	Cons
Limits the upfront investment	Potential for high rehosting costs over life cycle
Ensures dedicated access to required users	Accessible to a small base of users with restriction of single job on each machine
Pay as you go model - keeps the supplier motivated over the long term	Minimizes negotiation position with supplier resulting in potentially lower discounts

5. Can a user purchase a combination of licensing models?

II. COMMON SOFTWARE LICENSING MODELS

Most EDA vendors provide a number of different software licensing models. Some of the common models in use today are -

1. *Node locked license*: Is tied to a particular node/workstation and typically associated with one user. It is the cheapest license available when purchased in small quantities. It is a fairly common licensing model in the industry. See Table I for pros and cons.

Usage Model: Early phase of tool deployment, small base of users, dedicated interactive applications, 1:1 license to user ratio

2. *Server/Floating license*: Can serve a complete network of workstations by floating from one node to another based on use. It is available for use when not being used by another node. It is more expensive than a node locked license. It is a fairly common licensing model in the industry. See Table II for pros and cons.

Usage Model: Large design organization within a site, small set of licenses being shared by larger set of users (1 license for every 5-10 users), suitable for both batch and interactive usage

3. *Site license*: Is usually a large number of licenses purchased upfront for all users at a particular site. A site license works out to be cheaper than a node locked/

TABLE II
FLOATING LICENSING MODEL

Pros	Cons
Limits the upfront investment and minimizes rehosting costs	Spending increases linearly with usage with no upper limit on maintenance
Enables access to several users with additional benefit of multiple jobs that can be run on a single machine	Cannot be used across sites
Better utilization of licenses compared to node locked licenses	Administrative overhead in ensuring smooth running of licenses
Pay as you go model - keeps the supplier motivated over the long term	Minimizes negotiation position with supplier resulting in potentially lower discounts

TABLE III
SITE LICENSING MODEL

Pros	Cons
Lower per license costs compared to pay as you go model and lower administrative overhead	High upfront costs with potentially higher risk for lower return on investment
Lower long term costs if high license usage and high value is realized	Higher long term total costs if low value is realized from the solution
Access to full license capacity when needed potentially resulting in higher user productivity	Potential for excess unused capacity resulting in lower value
Potential for high quality of service from supplier (short to medium term)	Upfront commitment model - less motivation for supplier in maintaining long term performance

floating license on a per license basis for large volumes of licenses. See Table III for pros and cons.

Usage Model: Large number of licenses required with high utilization at a single site, stable technology, well defined and proven usage model and value

4. *Enterprise/Corporate license:* Extremely large/unlimited number of licenses that can be used across the entire enterprise or corporation. The costs are extremely high due to the license volume. It is not a very common licensing model in the industry. Even for vendors offering such a model, there is usually a cap on the maximum number of licenses that can be used. See Table IV for pros and cons.

Usage Model: Extremely large number of licenses required with very high utilization, used at multiple sites, 1 license on every desktop and server, interactive and batch usage

TABLE IV
CORPORATE LICENSING MODEL

Pros	Cons
Lowest per license costs compared to other licensing models	Highest upfront cumulative costs
Access to maximum license capacity when needed resulting in highest user productivity	Highest long term cumulative costs if low value is realized from the solution
Lowest administrative costs/overhead in license management	Upfront commitment model - less motivation for supplier in maintaining long term performance

TABLE V
RENTAL LICENSING MODEL

Pros	Cons
Costs can be minimized/deferred by not having to purchase a permanent set of licenses	Potential for higher long term costs if peak rental periods are not managed
Increased productivity due to availability of required capacity at critical periods such as tapeout	Cost overhead in converting rental licenses to permanent licenses

5. *Rental license:* A set of licenses is rented for a short period of time (1-6 months) with payment being made on a monthly/quarterly basis. Licenses cannot be rented unless a base set of licenses has been purchased. Typically, the number of rental licenses cannot exceed the number of permanent licenses. Maintenance is included in the rental costs. Options to obtain partial credit toward permanent licenses at the end of the rental period. See Table V for pros and cons.

Usage model: Base set of licenses with short term rentals for peak periods, suitable for cash limited companies

6. *Lease license:* Licenses are leased on a yearly/multi-year basis through a 3rd party leasing agency. Pricing includes maintenance and is based on number of licenses and term of lease. Multi-year lease offers better pricing than a single year lease. All licenses are provided upfront and can typically be traded in for other capabilities. See Table VI for pros and cons.

Usage Model: Smaller cash limited companies that require license capacity upfront, particularly suitable for short-term design projects that involve plug and play solutions without too much integration, single supplier relationship

7. *Taximeter/Pay per use license:* Payment is based on actual time usage of licenses. It assumes the purchase of a certain base level of licenses prior to having access to the taximeter model. The implementation of the taximeter model involves some administrative overhead in order to accurately track the actual time usage of the licenses. This is a fairly new licensing model in the industry being

TABLE VI
LEASE LICENSING MODEL

Pros	Cons
Peak capacity available upfront	Peak capacity upfront can result in under utilization of licenses
No long term commitment required - lease maybe terminated at any time	Can result in higher costs compared to purchasing a set of permanent licenses
Ability to trade-in existing capabilities for other capabilities	No end of life support

TABLE VII
TAXI METER LICENSING MODEL

Pros	Cons
Spending tracks actual license usage	Probability of higher costs due to potential for unconstrained usage
Maximizes utilization of licenses - helps develop more accurate license usage models	Significant administrative overhead in tracking actual license usage and payment mechanism
Access to unlimited license capacity with potential for increased user productivity	No controls on license usage can result in wasteful usage and therefore wasteful spending

TABLE VIII
PERFORMANCE-BASED LICENSING MODEL

Pros	Cons
Higher quality of service from supplier resulting in greater value gained	Potential for higher costs if supplier meets milestones and if there are multiple projects
Closer access to supplier R&D can result in higher productivity	One time only benefit for project with no sharing of good results with other projects
Higher degree of supplier motivation over the entire duration of the project	Lower return on investment shared with supplier

offered by a very small number of vendors. See Table VII for pros and cons.

Usage Model: No existing usage model, early adoption, short-term controlled usage

8. *Performance-based licensing:* This is usually project-based and involves the purchase of a base level of licenses upfront and the payment of bonuses based on the vendor meeting certain performance milestones. The vendor provides support of the milestones by providing additional licenses, on-site support, tool enhancements, etc. Sometimes, there is also a penalty clause in the agreement that requires the vendor to provide additional licenses/support in the event of not meeting milestones. See Table VIII for pros and cons.

Usage Model: Project specific usage that requires special focused effort by supplier to meet project goals, risk/benefit sharing with supplier, suitable for short term limited investment by cash-limited companies

III. COST MODELS FOR LICENSING MODELS

Fig. 1 shows the cost patterns for four different licensing models. Here are a few observations from the graph:

1. The corporate licensing model shows a pattern of high costs at the front end followed by low maintenance costs at the back-end. This is because once all the license payments have been made and the large number of licenses received, the cost drops to a fixed maintenance fee.

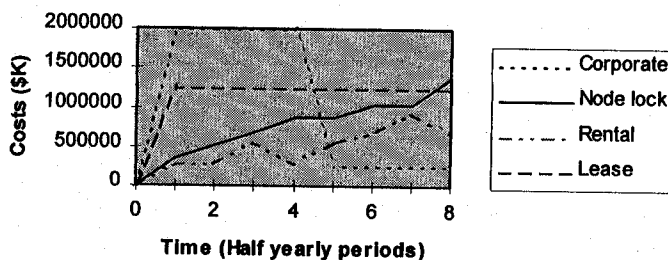


Fig. 1. Licensing model cost patterns

2. The node locked licensing model shows a pattern of costs increasing linearly with the number of licenses. This is because the node locked licenses are purchased at regular intervals on an as needed basis.
3. The rental licensing model shows a pattern of linearly increasing costs along with periods of sharp cost increases due to peak rentals during those periods.
4. The leased licensing model shows a pattern of flat spending across the entire time period. This is because each lease payment is equal to the other and provides a fixed set of licenses, maintenance, and support.

Fig. 2 shows the cost comparison of four different licensing models. Here are some inferences from the graph:

1. A corporate license has the highest life cycle costs while the rental model has the lowest life cycle costs based on the assumption that a corporate license provides access to an extremely large set of licenses and a rental model is used sparingly. Also, the rental model does not take into account the base set of licenses that have to be purchased.
2. On a per license basis, a floating license purchased using a pay as you go model has the highest cost while a license purchased under a corporate license has the lowest cost. This is because a corporate license results in a very large number of licenses whereas the floating license is assumed to be purchased using a pay as you go model.
3. A lease model falls in between a floating license pay as you go model and a rental license model both w.r.t cumulative costs and per license costs. However, since the leased licenses are not permanent, the costs are fairly high and could increase further both with time and the number of licenses. This further implies that the costs for the lease model have larger variance than the other models.

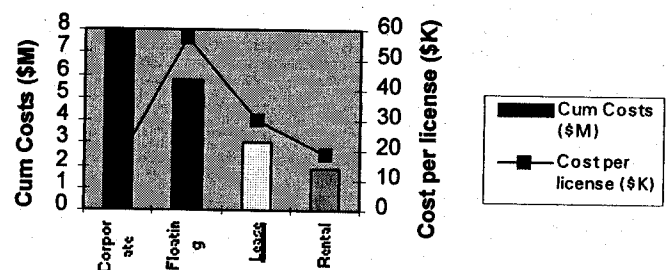


Fig. 2. Licensing model cost comparisons

IV. CHOOSING A LICENSING MODEL

A. Selection Criteria

Here are a few proposed criteria for choosing a licensing model:

1. *Costs:* Typically, tends to be a dominant factor in choosing a licensing model. However, both short-term (0-1 year) and long-term costs (1-5 years) need to be considered before selecting a specific licensing model. Also, the software budget needs to be taken into account in making a decision.
2. *Usage Model:* This is a very important but often overlooked factor in selecting a licensing model. One needs to determine how the licenses will be used throughout the project in order to best determine a suitable licensing model. In fact, in certain cases, a hybrid or combination licensing model maybe more suitable than any single model.
3. *Life cycle of the tool:* This is closely related to criteria 1 and 2. One needs to predict the length of time a specific tool will be used in order to determine a suitable licensing model. Ex. If a tool were to be used only for a period of six months, a lease model maybe the most suitable model. However, if a tool were to be used for a much longer duration, a site license maybe more appropriate.
4. *ROI:* ROI is defined as the ratio of benefit to cost and is also a very important but often overlooked factor in selecting a licensing model. Sometimes using the cost picture by itself without considering the corresponding benefits can be quite misleading. Ex. Based on costs, it would appear that the pay as you go model is the most optimum model. However, this can have a negative productivity (benefit) impact due to the restricted set of licenses. Therefore, in order to realize the full benefits and achieve high ROI, an upfront commitment model maybe more appropriate.

All the above criteria need to be weighted appropriately in order to make a final decision on a specific licensing model.

B. Case Studies

Here are a set of four case studies that illustrate the selection of specific licensing models -

1. Layout Verification

Usage Model: Tool is used on a large design project to run a large number of jobs with each job taking 6-12 hours for completion. The magnitude of the jobs and length of each job tends to increase for a month or two before tapeout.

Recommendation: Purchasing the taximeter/pay per use licensing model assuming that costs are equal to or less than other options. This option provides the greatest

flexibility, highest usage, and potential for highest ROI. Another option may be to buy an increasing set of floating licenses along with peak rental option to account for increased usage prior to tapeout. Selecting a third option such as a leased license may result in lower flexibility (fixed set of licenses) and lower ROI (unused licenses at higher cost).

2. Process Flow engine

Usage Model: A set of process flows is developed for a set of design activities in a project. The flows are then executed by a large set of designers on multiple projects at multiple sites with each designer requiring access to a license on a permanent basis. There are 2 types of licenses available - flow developer licenses and flow user licenses.

Recommendation: Buy a small set of node locked flow developer licenses for developers and a corporate/site flow user license for users. The assumption is that each flow developer and each flow user need a dedicated license on their desktops. Selecting another licensing model such as a shared set of floating licenses could result in license denials thereby causing lower productivity.

3. Schematic Editor

Usage Model: A schematic editor is to be used by 50 circuit designers for a short period of time (1-2 years). Each circuit designer needs to have exclusive access to a single license. In the long term, a schematic editor is being developed internally that will replace the external schematic editor.

Recommendation: Lease a set of 50 node locked licenses for a period of 1 year with option to extend the lease (Short term commitment). Selecting another model such as purchasing a set of 50 node locked licenses may result in higher costs and reduced usage and ROI particularly at the end of the use period.

4. Place & Route tool

Usage model: The existing place and route tool is inadequate for the next generation design project. Therefore, a new place and route tool will have to co-developed with the vendor in order to meet next generation functionality and die size requirements

Recommendation: Since there will have to be close cooperation between the vendor and customer, a project-based agreement is recommended. As part of the plan, a set of key milestones would be identified for the duration of the entire project (tool development and tool usage on design project). The vendor would provide the customer with licenses, consulting, and R&D support while the customer in turn would provide payments according to milestones reached. There would be a final bonus payment after the tapeout if the vendor has met the functionality and die size/density requirements. Selecting

another option such as a pay as you go model for licenses and consulting may result in higher costs and lower ROI due to "creep" factor and reactive nature of engagement.

V. PROBLEMS AND PROPOSED SOLUTIONS

1. Fundamentally, usage models are very poorly defined. Most vendors are not able to provide a solid basis for determining the number of licenses to be purchased. Also, the user community has not spent sufficient time attempting to come up with a reasonable usage scenario. This results in either a shortage or surfeit of licenses causing a lot of frustration for users and vendors.

We would like to propose that vendors and users work together and invest adequate time and effort in developing a good set of usage models.

2. Most vendors require an international uplift of 25-40% for licenses that will be used at international sites. This does not appear to be justified since software can be copied electronically from anywhere in the world at virtually no additional expense. On the other hand, we do concede that international uplift on maintenance and support is probably justified since the cost of sales in most countries tends to be higher than in the US.

We would like to propose that international uplifts on licenses be completely eliminated and international uplifts on maintenance and support be maintained.

3. Most vendors charge an uplift of 40% in order to convert a license that can only be used within a site to a license that can be used across all sites. This appears to be an extremely expensive option. Nowadays, a number of corporations have more than one site and there is a lot of information/data sharing between sites. Further, corporations need to maximize the use of their assets and need to have the option of using a license 24 hours a day across more than one site. The uplift seems particularly high considering that there is no additional fee involved if a site were to use its licenses 24 hours a day.

We would like to propose that the uplift on license use across sites be either completely eliminated or significantly reduced.

4. License transfer/Rehosting costs appear to be unjustifiably high - as much as \$1000-1500 for each transfer/rehost. The administrative costs of a license transfer/rehost appear to be much lower.

We would like to propose that vendors seriously consider either offering license transfer/rehosting as a free service or charging a very nominal fee say \$100 for each transfer/rehost.

5. Vendors regularly repackage their tools. Typically, this involves adding an option or two to the existing tool and

is accompanied by significant price increases. Further, the customer has little or no advance notice of the change.

We would like to propose that vendors consult with a set of their key customers before any form of repackaging. Also, they should give their customers an advance warning of at least 60 days before the repackaging takes effect. Both of these actions will ensure that customers will be better prepared for new, improved, and more expensive software packages!

6. In certain states such as California, software is not taxable if it is received electronically. This can result in significant tax savings to the customer. Currently, not all vendors have the facility of offering electronic shipments of software.

We would like to propose that all EDA vendors offer users the option of downloading software tools electronically by the end of 1997.

7. Need greater flexibility in mixing and matching the various licensing models. Currently, it is not always possible to purchasing a combination licensing model. Ex. A combination of rental and usage-based licenses. Also, it is not possible to convert from one licensing scheme to another.

We would like to propose that vendors and users work together in developing a standardized set of mechanisms to address the above issues.

VI. SUMMARY AND CONCLUSIONS

A detailed analysis of the common software licensing models in the EDA industry was presented. This helps establish a common understanding of EDA software licensing models and corresponding usage models for both EDA vendors and EDA users. Also, criteria for selecting a licensing model was presented along with a supporting set of case studies. By applying both the characteristics of the various licensing models and the proposed criteria, it is possible to determine the most suitable licensing model for a specific user scenario. This will direct users toward optimizing their costs, ROI, and software usage/utilization models, potentially resulting in significant overall value. Finally, a set of known problems with current software licensing models was presented along with proposed solutions. This will enable the EDA vendors to develop new licensing models and business models, which in turn, will cause the EDA users to enter into business engagements with such vendors. Overall, this can result in win-win relationships between vendors and users.

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