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第一阶段：专利权企业决策：
提起庭前和解、发起诉讼

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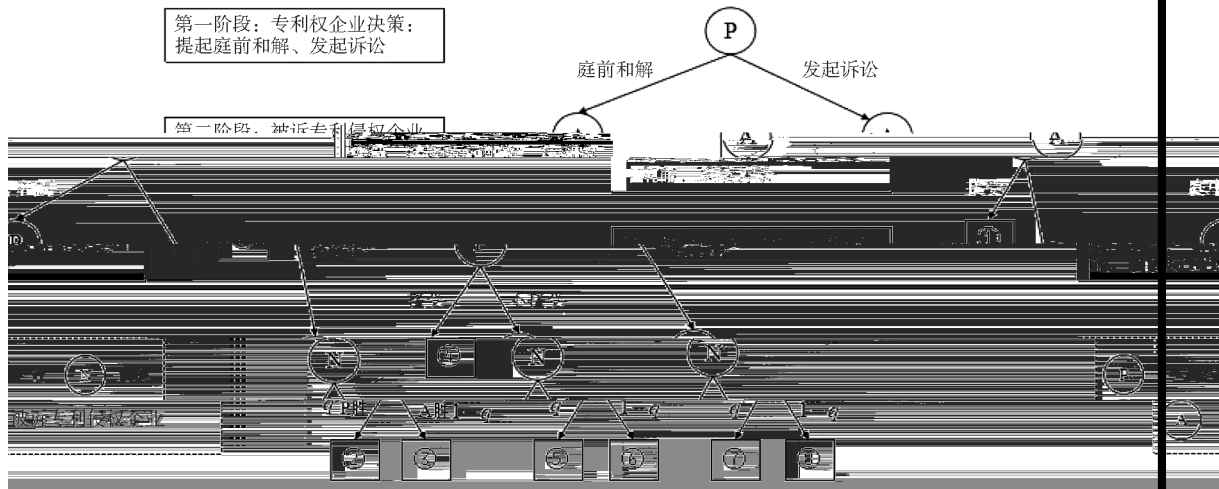
①$\{U_1-r,-U_1-r\}$；②$\{x-C_P(l)-r+R_P^{T_i},-x-C_A(l)-r-C_A^{T_i}\}$；

③$\{-x-C_P(l)-r+R_P^{T_i},x-C_A(l)-r-C_A^{T_i}\}$；④$\{U_2-r-C_P(l),-U_2-r-C_A(l)\}$；

⑤$\{x-C_P(l)-r+R_P^{T_i},-x-C_A(l)-r-C_A^{T_i}\}$；⑥$\{-x-C_P(l)-r+R_P^{T_i},x-C_A(l)-r-C_A^{T_i}\}$；

⑦$\{x-C_P(l)+R_P^{T_i},-x-C_A(l)-C_A^{T_i}\}$；⑧$\{-x-C_P(l)+R_P^{T_i},x-C_A(l)-C_A^{T_i}\}$，$i=0,1,2$。

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$E_{P_1}=(U_1-r)+\{q[x-C_P(l)-r+R_P^{T_i}]+(1-q)[-x-C_P(l)-r+R_P^{T_i}]\}$

$=U_1-2r-C_p(l)+x(2q-1)+R_P^{T_i}, i=0,1,2$ (1)

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$E_{P_2}=[U_2-r-C_p(l)]+\{q[x-C_p(l)-r+R_P^{T_i}]+(1-q)[-x-C_p(l)-r+R_P^{T_i}]\}$

$=U_2-2r-2C_p(l)+x(2q-1)+R_P^{T_i}, i=0,1,2$ (2)

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$E_{P_3}=q[x-C_p(l)+R_P^{T_i}]+(1-q)[-x-C_p(l)+R_P^{T_i}]=x(2q-1)-C_p(l)+R_P^{T_i}, i=0,1,2$ (3)

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$E_{A_1}=(-U_1-r)+\{q[-x-C_A(l)-r-C_A^{T_i}]+(1-q)[x-C_A(l)-r-C_A^{T_i}]\}$

$=-U_1-2r-C_A(l)-x(2q-1)-C_A^{T_i}, i=0,1,2$ (4

$$: U_1 = x(2q - 1) + C_A(l) + C_A^{T_i}, i = 0,1,2 \qquad (8)$$
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$$U_2 \geqslant U_1 > 0 \qquad (9)$$

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U_1 U_2 （1）（2） ，

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$$E_{P_1} = 2x(2q - 1) - 2r - C_p(l) + C_A(l) + R_P^{T_i} + C_A^{T_i}, i = 0,1,2 \qquad (10)$$

$$E_{P_2} = 2x(2q - 1) - 2r - 2C_p(l) + 2R_P^{T_i}, i = 0,1,2 \qquad (11)$$

$$E_{P_3} = x(2q - 1) - C_P(l) + R_P^{T_i}, i = 0,1,2 \qquad (12)$$

$$E_P = E_{P_1} + E_{P_2} + E_{P_3} = 5x(2q - 1) - 4r - 4C_P(l) + C_A(l) + C_A^{T_i} + 4R_P^{T_i}, i = 0,1,2 \qquad (13)$$

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$$C_A^{T_1} > C_A^{T_0} > C_A^{T_2} \geqslant 0 \qquad (14)$$

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$$R_P^{T_1} > R_P^{T_0} > 0 \geqslant R_P^{T_2} \qquad (15)$$

（13）、（14）（15）， $i = 0,1,2$ ，

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$$E_P^{T_0} = 5x(2q - 1) - 4r - 4C_P(l) + C_A(l) + C_A^{T_0} + 4R_P^{T_0} \qquad (16)$$

$$E_P^{T_1} = 5x(2q - 1) - 4r - 4C_P(l) + C_A(l) + C_A^{T_1} + 4R_P^{T_1} \qquad (17)$$

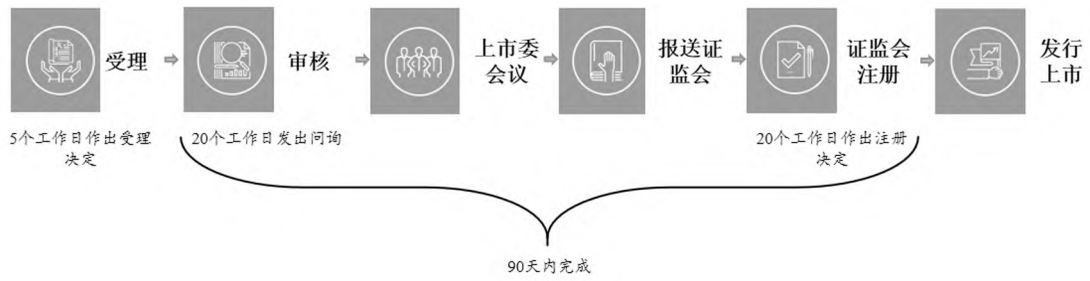$$E_P^{T_2} = 5x(2q - 1) - 4r - 4C_P(l) + C_A(l) + C_A^{T_2} + 4R_P^{T_2} \qquad (18)$$

， $E_P^{T_1} >$

$E_P^{T_0} > E_P^{T_2}$ ， ，

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受理 ⇒ 审核 ⇒ 上市委会议 ⇒ 报送证监会 ⇒ 证监会注册 ⇒ 发行上市

5个工作日作出受理决定　　20个工作日发出问询　　　　　　　　　20个工作日作出注册决定

90天内完成

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：⑦$\{x - C_P(l) + R_P^{T_{10}} - s, -x - C_A(l) - C_A^{T_{10}} - s\}$ ，

⑧$\{-x - C_P(l) - W_P - s, x - C_A(l) - V_A - s\}$。 IPO

， 1 ：⑦$\{x - C_P(l) - s, -x - C_A(l) - D_A - s\}$,⑧$\{-x - C_P(l) - W_P - s, x - C_A(l) - s\}$。 ，IPO

：

$$E_{P_3}^{T_{10}} = x(2p - 1) + pR_P^{T_{10}} - W_P + pW_P - C_P(l) - s \quad (26)$$

$$E_{A_3}^{T_{10}} = -x(2p - 1) + pV_A - V_A - pC_A^{T_{10}} - C_A(l) - s \quad (27)$$

$$E_{P_3}^{T_{11}} = x(2p - 1) - W_P + pW_P - C_P(l) - s \quad (28)$$

$$E_{A_3}^{T_{11}} = -x(2p - 1) - pD_A - C_A(l) - s \quad (29)$$

（10）、（11）、（26） （28），

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$$E_P^{T_{10}} = 4x(2q - 1) - 4r - 4C_p(l) + C_A(l) + 3R_P^{T_1} + C_A^{T_1} + x(2p - 1) + pR_P^{T_{10}} + pW_P^T - W_P^T - s \quad (30)$$

$$E_P^{T_{11}} = 4x(2q - 1) - 4r - 4C_p(l) + C_A(l) + 3R_P^{T_1} + C_A^{T_1} + x(2p - 1) + pW_P^T - W_P^T - s \quad (31)$$

（19）、（20）、（27） （29），

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$$E_A^{T_{10}} = -4x(2q - 1) - 4r - 5C_A(l) - 3C_A^{T_1} - R_P^{T_1} - x(2p - 1) + pV_A - V_A - pC_A^{T_{10}} - s \quad (32)$$

$$E_A^{T_{11}} = -4x(2q - 1) - 4r - 5C_A(l) - 3C_A^{T_1} - R_P^{T_1} - x(2p - 1) - pD_A - s \quad (33)$$

， $0 \leqslant p \leqslant 1$ ， $E_P^{T_{10}} - E_P^{T_{11}} = pR_P^{T_{10}}$ $\geqslant 0$ ， ，

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， 。 $p = 0, E_A^{T_{10}} - E_A^{T_{11}} = p(V_A + D_A - C_A^{T_{10}}) - V_A = -V_A < 0$ ，

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: Strategic patent litigation centered on timing and duration has become an important means for enterprises to block competitors from IPO and then further seek profits, which restricts the STAR Market to support the growth of high – tech enterprises that break through key core technologies. This paper focused on the patent litigation at the IPO stage of STAR Market, portrayed the timing strategy as litigation timing and litigation duration, and constructed a three – stage patent litigation game model. Based on this model, the paper firstly explored the impact of the patent enterprise's time strategy on the outcome of litigation and the profit of both parties, then introduced the patent validity and invalidation declarations to investigate the change of time strategy and profit of both parties, so as to help them make the optimal decision after considering the influence of time and profit comprehensively. By using backward induction method, this paper drew some main conclusions as follows.

First, for the patent enterprises, in the case that the accused patent infringing enterprise does not counterclaim, the best timing to litigate is when the accused patent infringing enterprise is in the IPO stage since IPO is an important event for the accused patent infringing enterprise, which needs to stay steady and avoid potential surprises that could derail their offerings. Therefore, litigation in IPO stage can strengthen patent enterprise's negotiating dominance, reach settlements with considerable licensing and other fees. Even if the settlement fails, litigation can make it difficult for the accused patent infringing enterprise to complete IPO registration within a limited period, potentially enhancing future competitive advantage of the patent enterprise.

Second, under the circumstance that the accused patent infringing enterprise may make a patent invalidation declaration, the patent enterprise should balance the risk of patent invalidation with the potential benefits. When the patent right is stable and there is no possibility of being invalidated, the patent enterprise can freely choose the timing of litigation before or after the IPO listing committee meeting. In addition, when the patent right is more likely to be invalidated, the patent enterprise should not file a lawsuit after the IPO listing committee meeting, which can easily provoke the accused patent infringing enterprise to complete the IPO with a "risk – backed" commitment and respond quickly, thus putting their own patents at risk.

For the accused patent infringing enterprise, when experiencing a patent dispute at the IPO stage, it should make a decision based on the quality of its own patent. If the facts of patent infringement are clear, seeking a quick pre – trial settlement is the best response strategy. If it is determined that the patent rights of the patent enterprise are unstable, the IPO process can be suspended and an invalidation declarations strategy can be adopted. Although this strategy can yield a deterrent effect on the patent enterprise and strengthen their own negotiating ability to some extent, the accused patent infringing enterprise has better decide between the cost of settlement in court and the cost of invalidation declaration, updating IPO documents and IPO underpricing. Moreover, in the event of patent infringement after the IPO listing committee meeting, the accused patent infringing enterprise with reliable patent quality should demonstrate their technical strength to the listing committee and the market through a "risk – backed" commitment to ensure a successful IPO, and synchronously file a patent invalidation declaration to fight back against competitors.

This paper has three contributions. First, beyond the extant research that mainly discusses the connotation and types of patent litigation strategy, this paper will enrich the litigation strategies from a time perspective to promote the development of patent strategy literature. Second, most of the literature takes time as the research background, ignoring the exploration of its essential role. This paper will also enrich the theory of time by focusing on the time strategy in patent litigation and characterizing it as timing and duration. Third, scholars have selected parameters of the game model from the aspects of the patent system, patent quality, and patent litigation costs, and analyzed their impact on litigation outcomes. This paper will broaden the factors that affect the patent litigation settlement by conceptualizing the parameters based on the time dimension. This paper also has some strong practical significance for guiding enterprises that intend to trade publicly on the STAR Market to deal with patent litigation, and systematically improve their intellectual property ability.

: patent litigation game; time strategy; litigation timing; litigation duration; STAR Market IPO